



CHEETAL

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BLACK BUCK

Photo—Rajesh Bedi





Fig. 1

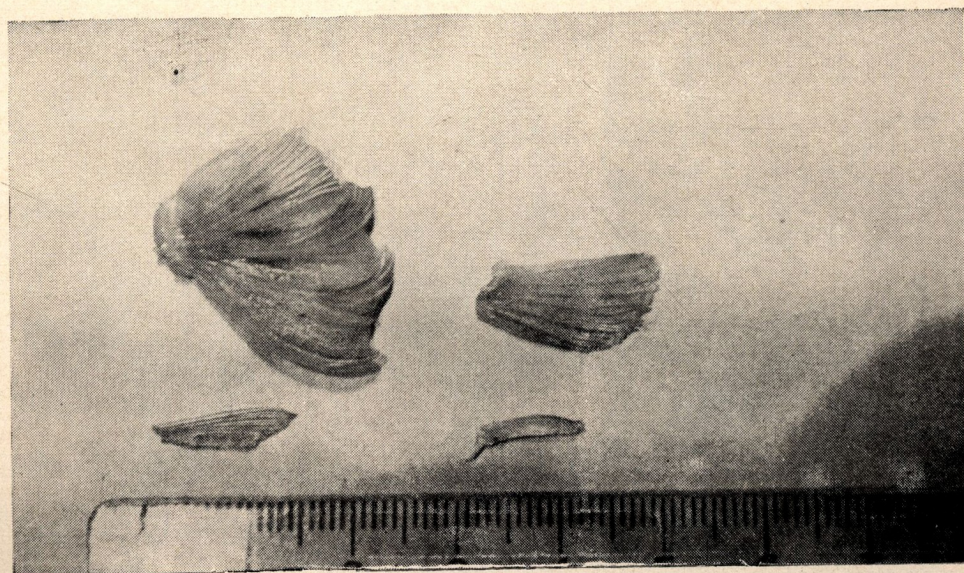


Fig. 2

(See Article on Page 49)

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*A tree is known by the fruit it bears;
A forest is known by the animals it rears.*

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CHEETAL

Journal of the Wildlife Preservation Society of India

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MESSAGE

Wildlife Week this year commences on the birth anniversary of Mahatma Gandhi. Gandhiji said:

“If the beasts had intelligent speech at their command, they would state a case against man that would stagger humanity.”

Respect for birds and wild animals, and the celebration of their existence as an integral element of the social milieu and of the fabric of human life, are part of the Indian heritage. We see evidence of this in all forms of art, sculpture, architecture, painting, pottery and music.

Unfortunately, however, as our population expands and our economy develops, wildlife and the environment they thrive in get increasingly endangered. It is, therefore, imperative that the areas designated for the preservation of wildlife be cherished and kept inviolate.

I extend my good wishes to Wildlife Week 1985.

Sd. Rajiv Gandhi

New Delhi
September 16, 1985

Wildlife Proof Barriers—Electric Fencing

In recent years, there have been increasing reports of conflicts with wildlife, such as elephant depredations on crops and dwellings, damage to crops by deer and wild boar, cattle lifting and man-eating by the larger predators. Such a situation has arisen primarily on account of human incursions into the wildlife habitats for agricultural and dwelling needs. In many cases, the conflict could be reduced substantially or stopped altogether if effective barriers could be set up to contain the wild animals within their habitats, thus preventing them from entering cultivated field and habitations. Some of the suggested methods include use of fire crackers, flares, torches, trenching and fencing, including electric fencing. These are some of the alternative measures which have been suggested to the States and Union Territories in place of the conventional use of crop protection arms.

For advising on setting up of electric fencing which has been used with some measure of success in countries like Malaysia, Australia, New Zealand, USA, Canada etc. the services of an expert consultant from the FAO were commissioned by Government of India. The consultant toured various problem areas in different parts of the country and has submitted a report on the prospects of setting up wildlife proof barriers in Indian conditions.

The report recommends the setting up of electric fencing as barriers in actual field situations initially for testing its effectiveness. The report also gives details of the designs, materials and the erection procedure for electric fencing. Action has already been taken in North Bengal and in the Dudhwa and Rajaji areas of Uttar Pradesh to set up field trials for testing the effectiveness of electric fencing as a barrier against the larger mammals. This has been done under the aegis of the Wildlife Institute of India. More such field trials would be taken up in the near future. The report has also been circulated to all the States and Union Territories faced with such problems, advising them to adopt the recommended measures. The Wildlife Institute of India will be the nodal agency for providing technical advice and guidance necessary for this purpose. It is hoped that with the adoption of this technology, it would be possible to reduce greatly the man-wild animal conflicts within the country.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Fifth Meeting of the Conference of the Parties

Buenos Aires (Argentina), 22 April to 3 May 1985

Speech of Mr. Samar Singh, Standing Committee Chairman

It was my proud privilege to address the opening session of the Fourth Meeting of the Conference of the Parties held at Gaborone exactly two years ago. I deem it a rare honour to have the same privilege today as I rise, on behalf of the CITES Standing Committee, to extend a warm welcome to everyone present here on this occasion, which marks the start of the Fifth Meeting of the Conference of the Parties:

At the outset, may I say how deeply beholden we are to His Excellency Dr. Victor Martinez, Vice President of the Republic of Argentina, who has so kindly agreed to be with us and to deliver the inaugural address. This is a measure of the importance which His Excellency attaches to the objectives of CITES and the purposes of this meeting. We are equally delighted that the honourable Ministers and other dignitaries of the Government of Argentina and members of the diplomatic community have found time to join us this morning, and I thank them all warmly on behalf of the Parties to CITES.

Addressing the Gaborone meeting, I had referred to it as 'historic' for more than one reason. I now feel that this meeting is also making history for reasons more than one. First of all, this meeting marks the start of the second decade of CITES, the period of maturity. During the last couple of years, it has been said often that 'CITES has come of age'. This second decade will demonstrate whether this claim is really deserved or not. The maturity of 87 nations who today collectively stand for CITES will be on real test during this period.

This meeting is significant for yet another reason: it is taking place in a region which is not only a major producer of wild fauna and flora but also represents a dozen States, all of whom are now Parties to CITES. This is a development worthy of note since the First Meeting of the CITES Parties held in 1976, when only four States of this region were adherents of CITES. This is a distinction unique for a region having so many countries and representing cultures, facets and interests which are as diverse as they are rich. May I take this opportunity to complement the peoples and governments of all these States for their wisdom is coming forward in such manner to strengthen the Convention, and for giving explicit recognition to the principle that it is only through mutual help and international co-

operation that the full and continuing benefit of natural living resources can be secured for the larger good of human kind.

In this respect, our hosts, the Government of Argentina, are in the forefront in this part of the world. Though this State joined the CITES movement rather recently, it has taken significant strides by not only adopting the CITES controls but also undertaking a major revision of its wildlife law, including a list of native species that are protected and whose products are prohibited from import and export. It is well known that Argentina is one of the granaries of the world. It also has a rich and diverse heritage of wildlife, whose preservation in perpetuity is of great importance to man kind in general. It is only appropriate that this meeting is being hosted in such a country, whose people and government have displayed determination in carrying forward the message of CITES in intent and by example. Needless to add that this determination is evident in ample measure in the excellent arrangements made for this meeting. I am sure I am expressing the sentiments of all the Parties and the participants to this meeting in felicitating our hosts and thanking them warmly for this effort, which should surely place one more firm and lasting slab on the edifice of CITES.

Much water has flown no doubt since the last such meeting at Gaborone in 1983. The agenda of the meeting covers a review of the progress made and we will have ample opportunity to attend to the major issues in the next few days. However, two aspects stand out and deserve special mention on this occasion.

The first relates to positive steps taken to strengthen regional co-operation during the last couple of years. This is best exemplified by the regional seminars held at Washington, Brussels and Kuala Lumpur, which helped, for the first time, in bringing together most of the Parties of Latin America, Africa and Asia, thus strengthening regional understanding and co-operation as well as increasing the effectiveness of CITES implementation. I have no doubt that these regional seminars have been very useful and similar efforts deserve to be encouraged in future.

The second important development is the move for the setting up of a strong and separate CITES Secretariat, bearing in mind the increase in the number of Parties and the need for providing better services to Parties. This move was initiated earlier to the Gaborone meeting but it is during the last two years that some concrete steps have been taken. As a result, fresh arrangements have been made with UNEP and the CITES Secretariat is now located in a new premises at Lausanne in Switzerland. This move was supported and overseen by the Standing Committee on behalf of the Parties and rendered possible with the active help and co-operation of UNEP and IUCN, with whom CITES has a long and abiding association and partnership. Let me add, however, that this is only a step forward

in the direction we have chosen. The logical culmination lies in the adoption of the financial amendments to the Convention, which will hopefully be accomplished in the near future.

The intellectual, technical and scientific links with the IUCN remain as strong as ever. This is as it should be, considering that the Convention is as much the result of an IUCN initiative, the role played by IUCN in the elaboration of the Convention text, and the support provided by IUCN, in co-operation with UNEP, for the administration of the Convention as well as the calls made by the Parties, from time to time, for the provision of technical and other expertise by the IUCN and its components. The presence of the Director General of IUCN in this meeting is itself an indication of the continuing and close relationship between CITES and IUCN in the the larger cause of world conservation.

With UNEP, our relationship is closer than ever before. This is obvious considering the requirements of Article XII of the Convention, which call upon the Executive Director of UNEP to provide the Secretariat to the Convention and the active support and involvement of UNEP, from the very beginning, in promoting the cause of CITES and particularly in managing the Trust Fund. I have no doubt that these bonds will be strengthened further in the future. I am particularly happy that the Deputy Executive Director of UNEP and his colleagues are with us to lend support to the long and abiding relationship between the two organisations.

It is well recognised that the main objective of CITES is the protection, through international co-operation, of wild fauna and flora against exploitation through international trade. CITES is, therefore, mainly a conservation convention which requires the co-operation of both importing and exporting countries for an effective implementation of trade controls. This involves the 'consumer' as such as the 'producer' States. While this philosophy is now widely understood and CITES has a large coverage on a world wide basis, significant gaps still remain in geographical coverage and deficiencies as well as inadequacies in implementation and enforcement are continually being noticed. There is also the problem of a lack of financial commitment by some Parties, which places a heavy burden on the contributing Parties and threatens the smooth operation of the Convention. It is obvious that the effectiveness of CITES can be secured only if all concerned work together in concert to remove the gaps and inadequacies and if each Party makes its contribution, financial or otherwise, in fully promoting the cause of CITES.

In a world beset with acute problems of hunger, want and dwindling natural resources the only hope lies in mutual help and co-operation and the Gandhian ethic of restraint and frugal use of natural resources. To this end, let a powerful call go out from this Conference of the Parties for creating deeper understanding and acceptance of such principles among all people and nations of the world.

Ultimately, it has to be understood that CITES is only a means to an end: the end being human survival and well-being. Conventions like CITES and documents like the World Conservation Strategy and the World Charter for Nature, are, in effect, only instruments to awaken the human conscience, on a world wide basis, for this ultimate purpose. Therefore, the significance and success of this meeting will eventually lie in the contribution it makes in arousing the conscience of the world community specifically for the purposes of CITES and generally for the larger cause of international conservation.

In this task, the non-government organizations have a special role and I am happy that so many of them from different parts of the world are present here to lend their support. I might emphasize that the active involvement of NGO's is a unique feature of CITES, which has, in a way, set a precedent for other international conventions to follow. At Gaborone, I had called upon all NGO's to redouble their efforts in spreading the gospel of CITES. May I repeat this call today in recognition of the important role which they have in this respect and recognizing that the need for this is greater now than ever before.

Before concluding, I would like to quote the Late Prime Minister of India, Mrs. Indira Gandhi, who became a legend in her own time as a dedicated champion of nature conservation and whose sudden and most tragic demise six months back is a great loss to the world conservation movement. I would like to recall what she had said while addressing the Plenary Session of the UN Conference on the Human Environment held in 1972. I quote:

"One cannot be truly human and civilized unless one looks upon not only all fellow-men but all creation with the eyes of a friend."

"It has been my experience that people who are at cross purposes with nature are cynical about mankind and ill-at-ease with themselves. Modern man must re-establish an upbroken link with nature and with life. He must again learn to invoke the energy of growing things and to recognize, as did the ancients in India centuries ago, that one can take from the Earth and atmosphere only so much as one puts back into them. In their hymn to Earth, the sages of the Atharva Veda chanted:

"What of thee I dig out, let that quickly grow over,
Let me not hit thy vitals, of thy heart."

So can man himself be vital and of good heart and conscious of his responsibility." (unquote)

Let this be the central message coming out of this conference.

Wildlife Management as A Strategy for Proper Land Use

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AND

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Wildlife is one of the most important renewable resource in developing countries and is used by the indigenous population in a variety of ways. It, however, is increasingly threatened by the growth of human population and introduction of various forms of land use which considerably change or completely destroy environments specific to species. On the other hand the animal protectionists and holders of an outdated concept of national parks in the false hope of a natural self regulatory process, are unaware of the fact that it would create dense wildlife concentration and such overcrowded national parks may soon become "Wildlife Slums". Therefore, wildlife management on ecological basis should be introduced in regional or national research programmes and development planning. This unfortunately is ignored in developing countries. A national convention is now introduced in African countries, and India is the lone example in South Asian Countries to have such convention.

The utilisation of wildlife should be understood as a special form of land use involving direct or indirect satisfaction of human desire. The most ancient form of land use is represented by gathering economy together with subsistence hunting and fishing as is even now seen in remote tribal areas like Baster. The next phase of development of land use is seen as shifting slash and burn agriculture. In this practice more intensive utilisation of local wildlife played an essential role for rural population. 70% of total meat consumption in Ghana is from utilisation of wildlife on such practice. So is the case of nomadic tribes in India and other developing countries.

Various other forms of commercial utilization of wildlife exist. Apart from hunting and tapping of wild products as well as forest honey production are important sources of income and employment and serve as proper use of land. However, uncontrolled utilisation of wildlife by products such as hides, skins, horns, ivory, fangs, claws, rhinoceros, horn, stomach stones etc. poses deadly damage for the continued existence of numerous wildlife species. This has happened in the case of rhinoceros and tiger in India and pygmy hippopotamus in West Africa.

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Controlled sport or trophy hunting is by far the oldest and most common form of wildlife management which is now extensively developed in practically in all countries of the tropical belt of Africa. Thus hunting tourism is in general practice, according to licence system, in publicly or private own reserve or estates, divided into hunting zones or blocks. The necessary investment in this type of land use is required for the construction or maintenance of a suitable infrastructure, roads, bridges, equipment and vehicles, landing strips, aircrafts, accommodation etc. Besides, these recurring expenses for staff for surveillance are also incurred. Therefore, concentration must be made on tourist hunters who can pay high licence fee. Thus hunting tourism should be developed with photo-safari. The non-consumptive wildlife utilisation by international tourism is concentrated almost exclusively upon the National Parks in most of the developing countries. But unstable and suddenly changing political conditions in many African countries lead to a catastrophic reduction in the flow of tourists and hence to considerable financial losses. The socio-economic problems resulting from the stream of foreign tourists into developing countries are now critically evaluated.

The most profitable form of intensive utilisation of wildlife is through "game ranching" and "game farming". The game ranching is carried out on relatively large areas which are extensively managed. The profits of game ranches exceed those achieved by cattle rearing. A wildlife management project in the Masai area of Kenya, which formed an integral part of a land utilisation project, also showed unequivocally that wildlife utilisation yields a higher financial return. Such ranches can be developed on infertile land or in tribal areas where intensive agriculture can not be practised in India. In game farms, the aim is partly or completely to tame game animals as a precondition for many ways of manipulating the species. The black buck, chital, sambar, antelopes, are some of the animals suitable for game farming. Personal ownership of wild animals is regarded as a pre-condition for rational management. The ownership of land in arid region is ecologically not possible and for rational utilisation these regions can only succeed with animals adapted to the countries.

In planning therefore, a partition of a region into separate land use zones should be done on the basis of these ecological potentials. Such zones should be practised either exclusively for certain land use forms like dry or irrigation farming cattle rearing wildlife utilisation or forestry, or in combination of a number of mutually compatible forms of utilisation, like cattle and game management or forest and game management. The multiple utilisation of the natural resources should be given preference over a single form of land use. It possesses a lesser stress upon the natural ecosystem. The zoning of a region would lead to a gradual transition from one form of utilisation to another, with mutually exclusive land use forms located at

extreme ends of a separature. It would remove situations of conflict. In tribal village areas the series should run: nationa; oard; wildlife management area, combined game and domestic animal utilisation intensive cattle rearing, intensive crop growing.

In the regional planning of rural areas the wildlife management must not only be an integral part of ecologically oriented land use and regional planning but must also be integrated more tightly into the socio-economic and political structure. The direct participation of the rural population in the financial gains from the management of wild animals is of considerable importance, because it demonstrates the personal economic advantage to be gained from the delimitation of areas for the various forms of wildlife management. This applies especially to national parks and equivalent reserves where restrictions are strongest and where the impression must easily arise that the affected population benefits little by this form of land utilisation. The detailed information on wildlife ecology framing of regulating laws depending on regional situation and rules for managing and utilising game are therefore, necessary for giving wildlife management its proper place as a valid form of land use.

A List of Carnivorous Mammals of India

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Animals eating flesh are generally termed as Carnivores but more accurately and precisely, any mammal of the order Carnivora, which includes the beasts of prey as Lion, Tiger, Leopard, Jaguar, numerous fur bearing mammals, such as, seals, fox and sables, the domesticated cats and dogs and other well known animals. However, the term carnivora suggesting that all the animals so designated are flesh eaters, is not entirely appropriate. Certain highly organised species of cats, wolf and weasel could live only upon the flesh of warm blooded animals for the capture of which their structure and habits are admirably adopted, but others, like most bears are vegetable feeders and quite unfitted for the chase.

No single character absolutely distinctive of carnivora can be named but by the combination of structural features it may be distinguished from other mammals. There are never less than four toes on each foot, and the first is never opposable to the rest, the digits are usually armed with compressed claws, never with nails or hoofs; there are typically two tufts of tectile 'whiskers' (Vibrissae) on each cheek; the tail is always present; separate genital and anal openings; abdominal mammae; two sets of teeth, permanent and milk, differentiating into incisors, canines and cheek teeth.

Variations in their diet are, therefore, accompanied by suitable variations in their limbs, teeth, skeleton and other external organs. In flesh eating mammals, the piercing canines are modified for tearing flesh. Toes of majority of species are provided with sharp and sturdy claws for holding prey.

Though some carnivora are destructive to domestic animals and even to human life, many are valuable fur bearer as sable, otter, marten, mink, fox and fur seals.

Carnivora are well represented in all parts of the world except Australian Region, which contains only dingo, a dog brought by man.

Carnivora, one of the biggest mammalian order, is represented in India by 59 species, belonging to seven families and 27 genera. The authors while going through various references have realised that the complete and comprehensive list of the Indian Carnivores, with their common, and local names and their distribution, is not available to readers and laymen. The need was thus felt to produce this article. The species included, hereunder, are irrespective of their present status. However, the known distribution have been compiled and presented in this article.

ORDER CARNIVORA (7 families, 27 genera and 59 species)

FAMILY 1. FELIDAE (4 genera and 17 species)

GENUS 1. *Felis* Linnaeus (11 species)

- Species 1. *Felis marmorata charltoni* Gray
Common Name: Marbled Cat
Local Name : Sikmar, Dosal
Distribution: Sikkim, Assam
- Species 2. *Felis temmincki* Vigors and Horsfield
Common Name: Golden Cat or Fire Cat
Distribution: Himalayas at moderate elevations, Sikkim and Assam.
- Species 3. *Felis bengalensis horsefieldi* Gray
Common Name: Leopard Cat
Local Name: Chitta Billa, Ban Bilao
Distribution: Kashmir, U.P. (Kumaon), Assam, Coorg and Palni Hills, Kanya Kumari.
- Species 4. *Felis viverrina* Bennet
Common Name: The Large Tiger or Fishing Cat
Local Name: Bun Biral, Kupya Bagh
Distribution: U.P. (Kumaon) Western Ghats and Bengal
- Species 5. *Felis rubiginosa rubiginosa* Geoffroy
Common Name: Rusty Spotted Cat
Local Name: Namali Palli or Vereva Puni (Tamil)
Distribution: Tamil Nadu (Madras) and Hills of South India; Maharashtra (Khandala).
- Species 6. *Felis manul nigripes* Pallas
Common Name: Pallas's Cat
Local Name: Not known
Distribution: Ladakh
- Species 7. *Felis libyca ornata* Gray
Common Name: Indian Desert Cat
Local Name: Jhang Meno
Distribution: Dry rocky north-west India, U.P. (Banda to Agra); Punjab; Gujarat (Kutch); and Rajasthan and Maharashtra (Poona).

Species 8. *Felis chaus affinis* Gray

Common Name: Jungle Cat

Local Name: Junglee Billi, Ban Billi, Katas, Ban Beral.

Distribution: Throughout the himalayas to extreme south extending eastwards to Assam and Sikkim.

Species 9. *Felis Lynx isebellina* Blyth

Common Name: Lynx

Local Name: Patsalam, Phiauku

Distribution: Kashmir

Species 10. *Felis caracal schmitzi* Matschie

Common Name: Caracal Lynx

Local Name: Siah Gosh

Distribution: U.P., Gujarat (Kutch), Punjab, Rajasthan

Species 11. *Felis domestica* Gmelin

Common Name: Domestic Cat

Local Name: Billi

Districution: Common

GENUS 2. *Neofelis* Gray (one species)Species 12. *Neofelis nebulosa* Griffith

Common Name: Clouded Leopard

Local Name: Tungmaar, Lepcha

Distribution: Assam and Sikkim

GENUS 3. *Panthera* Oken (4 species)Species 13. *Panthera leo persica* Meyer

Common Name: The Lion

Local Name: Sher, Singha, Sherbabar

Distribution: Once found over whole of Northern and Central India, now restricted to Gir Forests, Kathiawad (Gujarat)

Species 14. *Panthera tigris tigris* Linnaeus

Common Name: The Tiger

Local Name: Bagh, Sher

Distribution: From Himalayas to Kanya Kumari except in deserts of Rajasthan, Punjab, Gujarat (Kutch).

Species 15. *Panthera pardus* Linnaeus

Common Name: The Leopard or Panther

Local Name: Tenduwa or Chitta, Sona Chitta, Bagh, Guldar

Distribution: Common

Species 16. *Panthera uncia* Schreber

Common Name: Snow Leopard or Ounce

Distribution: Kashmir, U.P. (Garhwal)

GENUS 4. *Acinonyx* Brookes

Species 17. *Acinonyx jubatus* Schreber

Common Name: Cheetah or Hunting Leopard

Distribution: Deccan, Punjab (Now extinct)

FAMILY 2. Canidae (3 genera, 7 species)

GENUS 5. *Canis* Linnaeus (3 species)

Species 18. *Canis lupus* Linnaeus

Common Name: Wolf

Local Name: Bheddia, Bheria

Distribution: Kashmir to Dharwar in south to Bengal in North east.

Species 19. *Canis palipes* Sykes

Common Name: The Indian Wolf

Local Name: Hundar, Hurar

Distribution: Whole of the Indian Peninsula south of Himalaya, Rajasthan and Gujarat

Species 20. *Canis aureus aureus* Linnaeus

Common Name: Jackal

Local Name: Gidhar, Siar, Sial, Shrigala, Syar

Distribution: Common

GENUS 6. *Cuon* Hodgson (1 species)

Species 21. *Cuon alpinus primaevus* Hodgson

Common Name: Indian Wild Dog

Local Name: Dhole, Junglee Kutta, Son, Ram, Ban Kutta

Distribution: Western Himalaya (Nainital, Corbett National Park), Assam

GENUS 7. *Vulpes* Oken (3 species)Species 22. *Vulpes vulpes montana* Pearson

Common Name: Red Fox, or Hill Fox

Local Name: Loh, Lomri

Distribution: Over Himalayas from Sikkim to Kashmir

Species 23. *Vulpes vulpes benghalensis* Shaw

Common Name: Indian Fox or Bengal Fox

Local Name: Lomri or Lomar

Distribution: Common

Species 24. *Vulpes vulpes griffithi* Blyth

Common Name: Desert Fox

FAMILY 3. HYAENIDAE (1 genus one species)

GENUS 8. *Hyaena* BrissonSpecies 25. *Hyaena hyaena hyaena* Linnaeus

Common Name: The striped hyaena

Local Name: Kirba, Lakkar Bagha, Bagh, Hundar

Distribution: Kumaon Sub montane tract, Garhwal (U.P.) and Assam.

FAMILY 4. MUSTELLIDAE (6 genera and 12 species)

GENUS 9. *Martes* Pinel (2 species)Species 26. *Martes flavigula* Boddaert

Common Name: The Indian Marten or Yellow throated marten

Local Name: Chitrola (Kumaon)

Distribution: Himalayas from Kashmir to Assam through Uttar Pradesh; and Travancore in south.

Species 27. *Martes foina intermedia* Erxleben

Common Name: The Beech Marten or Stone marten

Distribution: Sikkim and Kashmir.

GENUS 10. *Mustela* Linnaeus (3 species)Species 28. *Mustela putorius larvatus* Hodgson

Common Name: The Thibetan Pole Cat

Distribution: Sikkim

Species 29. *Mustela kathiah* Hodgson

Common Name: Yellow bellied Weasel

Distribution: U.P. (Mussoorie); Sikkim; Meghalaya (Khasi Hills).

Species 30. *Mustela sibirica hodgsani* (Gray)

Common Name: Siberian Weasel or Himalayan Weasel

Distribution: Western Himalaya, U.P. (Chamba) at the range of 7000 tp. 9000 ft.

GENUS 11. *Arctonyx* Cuvier (1 species)

Species 31. *Arctonyx collaris* Cuvier

Common Name: The Hod Badger

Local Name: The Bear Pig, Bala Sur

Distribution: Assam, Sikkim terai, Bhutan Duars.

GENUS 12. *Lutra* Brisson (3 species)

Species 32. *Lutra lutra lutra* Linnaeus

Common Name: The Common Otter

Local Name: Ud Bilao, Pani Kutta, Niru Kutta, Neerunai

Distribution: It extends to Himalayas from Gilgit to Brahmputra (4000 ft to 12000 ft) through Assam; Eastern half of Indian Peninsula from foot of Himalaya to Pondicherry.

Species 33. *Lutra lutra monticola* Hodgson

Common Name: Common Otter

Distribution: Punjab, U.P. (Kumaon and Garhwal), Sikkim and Assam.

Species 34. *Lutra proscipillata* Geoffroy

Common Name: Smooth Coated Indian Otter

Local Name: Ud, Udni, Ud bilao, Ludra, Jalmanus, Niru Kuku

Distribution: Indian Peninsula, from foot of Himalayas to Travancore (Ganges to Indus River).

GENUS 13. *Aonyx* Lesson (1 species)

Species 35. *Aonyx cinerra* Illiger

Common Name: Oriental Small Clawless Otter

Local Name: Chusan

Distribution: Assam, U.P. (Mussoorie); and throughout eastern half of Indian Peninsula from Himalaya to Kanya Kumari, Nilgiri Hills and Bengal.

GENUS 14. *Mellivora* Storr (1 species)Species 36. *Mellivora capensis indica* Kerr

Common Name: Indian Ratel or Honey Badger

Local Name: Bijju, Bijru Bhal, Biyu, Kharwar

Distribution: Common

FAMILY 5. PROCYONIDAE (1 genus and 1 species)

GENUS 15. *Ailurus* CuvierSpecies 37. *Ailurus fulgens* (Cuvier)

Common Name: The Cat Bear or Red Panda

Local Name: Panda, Sankam

Distribution: Eastern Himalaya above 7000 ft to 12000 ft, Sikkim

FAMILY 6. VIVERRIDAE (8 genera and 17 species)

GENUS 16. *Arctogalidia* Merriam (1 species)Species 38. *Arctogalidia trivirgata* Millsi Wroughton

Common Name: Small Palm Civet

Distribution: Sikkim

GENUS 17. *Herpestes* Illiger (6 Species)Species 39. *Herpestes auropunctatus pallipes* Blyth

Common Name: Small Indian Mongoose

Distribution: Kashmir, Gujarat, Manipur, Assam, Orissa, Punjab and Bengal.

Species 40. *Herpestes edwardsii nyula* Hodgson

Common Name: Gray Mongoose

Local Name: Mungli, Nyula, Newala

Distribution: Common

Species 41. *Herpestes smithi smithi* Gray

Common Name: Ruddy Mongoose

Distribution: Gujarat, Rajasthan, Bengal, Kashmir and Western Ghats.

Species 42. *Herpestes fuscus fuscus* Waterhouse

Common Name: Indian Brown Mongoose

Local Name: Konda Yantara

Distribution: Common, but rare in Kashmir.

Species 43. *Herpestes vitticollis vitticollis* Bennet

Common Name: Striped necked Mongoose

Local Name: Keeree, Kerree

Distribution: Malabar Coast, Western Ghats, Coorg, Travancore.

Species 44. *Herpestes urva* (Hodgson)

Common Name: Crab eating Mongoose

Local Name: Urva

Distribution: Assam

GENUS 18. *Paguma* Gray (3 species)

Species 45. *Paguma larvata grayi* (Bennet)

Common Name: Masked Palm Civet

Distribution: Simla (H.P.), Assam, Chhota Nagpur (Bihar), Kumaon and Garhwal (U.P.) and Andaman Islands.

Species 46. *Paguma larvata wroughtoni* Schwarz

Distribution: U.P. (Kumaon), Kashmir.

Species 47. *Paguma larvata neglecta* Pocock

Distribution: Assam

GENUS 19. *Paradoxurus* Cuvier (2 species)

Species 48. *Paradoxurus hermaphroditus bondar* Desmaert

Common Name: Toddy Cat or Common Palm Civet

Local Name: Lokati, Jharka Kutta

Distribution: Sikkim Terai, Assam, Bengal, U.P. (Kumaon) and Kashmir.

Species 49. *Paradoxurns jerdoni* Blanford

Common Name: Jerdons' Palm Civet

Distribution: Madura Hills, Nilgiri Hills, Palni Hills, Coorg and Travancore.

GENUS 20. *Prinodon* Horsfield

Species 50. *Prinodon linsang linsang* Hardwicke

Common Name: Banded Linsang

Species 51. *Prinodon pardicolor* Hodgson

Common Name: The Tiger Civet or Spotted Linsang

Local Name: Zik Chum, Suilyu, Silu

Distribution: Darjeeling, Sikkim, Assam.

GENUS 21. *Viverra* Linnaeus (2 species)Species 52. *Viverra zibetha* Linnaeus

Common Name: Large Indian Civet Cat

Local Name: Catas, Mach bhondar, bagdos, Pudo gaula

Distribution: Bengal, Orissa, Sikkim, Assam

Species 53. *Viverra megaspila civettina* Blyth

Common Name: Large spotted Civet

Distribution: Malabar Coast, Coorg, Western Ghats and Travancore

GENUS 22. *Viverricula* Hodgson (1 species)Species 54. *Viverricula indica bengalensis* Gray and Hardwicke

Common Name: Small Indian Civet

Local Name: Mushk Billi or Kasturi

Distribution: Rajasthan, U.P., Bengal, Deccan states, H.P. and Punjab.

GENUS 23. *Arctictis* Temminck (1 species)Species 55. *Arctictis binturong* Raffles

Common Name: Binturong or Bear Cat

Local Name: Young, Myouk Kya

Distribution: Himalayas, H.P., Assam and Sikkim.

FAMILY 7. URSIDAE (4 genera, 4 species)

GENUS 24. *Ursus* Linnaeus (1 species)Species 56. *Ursus arctos isabellinus* Horsfield

Common Name: Snow Bear, Brown bear or Blue bear

Local Name: Lal Bhalu or Barf ka Reech, Safed Bhalu, Siala Reech

Distribution: Higher reaches of Himalayas eastwards to Assam and Westwards to Punjab and Kashmir.

GENUS 25. *Melursus* Meyer (1 species)Species 57. *Melursus ursinus* (Shaw and Nodd.)

Local Name: Reech, Rienchh, Riksha, Bhalu

Distribution: The whole of Indian Peninsula in Himalayas eastwards to Bengal and Assam.

GENUS 26. *Selenarctos* Heude (1 species)Species 58. *Selenarctos thibetanus leniger* Pocock

Common Name: The Himalayan Black Bear

Local Name: Bhalu

Distribution: Kashmir to Assam, along range of Himalayas.

GENUS 27. *Helarctos* Horsfield (1 species)

Species 59. *Helarctos malayanus* Raffles

Common Name: Malayan Sun Bear

Distribution: Garo Hills (Assam) and Chittagong.

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Deer Parks

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Deer are not only beautiful animals but their presence in any natural habitat or zoological parks, adds to the aesthetic charm of the locality also. The natural habitat of this animal has been depleted, year after year, for agriculture, rehabilitation, Industries, Hydro-electric schemes, and other projects. Deterioration of its habitat undoubtedly effects its numbers as well as the population of several other animals such as endangered species of carnivores that mostly subsist on them. The objectives of management of deer parks have evolved gradually from needs for simple recreation to other multiple functions such as, conservation and rehabilitation. In view of the dwindling funds and disappearance of many species such animals may be bred in captivity for replenishment of depleted territories.

Objectives of a Deer Park may be stated as follows:

Entertainment Parks are places where people can see wild animals and delight in nature's munificence.

A Deer Park is an inexpensive form of entertainment made popular in the present age of machines and provides recreation for local and foreign tourists as well.

Education

Educating people in the values of wildlife and the life history of animals uncommonly known, is an important object of a Deer Park. At leisure and without having to go into the forests, students can come to see animals in Deer Parks.

Research

Study of the deer tribe and research on their behaviour, social interaction among animal groups and cause of death of the animals can be carried out.

Tourism

Deer Parks contribute to tourism and large numbers of local and foreign tourists of various classes and zones frequent such resorts.

Conservation and Rehabilitation

In view of the dwindling fauna and disappearance of many species of deer from some areas, such endangered animals can be bred in captivity for rehabilitating them in their natural habitat later.

Before introducing a particular species in a Deer Park, we must know about the habits and natural habitat of the animal. Natural habitat and habits of some Deer are briefly given below:

Cheetal (*Axis axis*)

Distribution of cheetal runs along the foothills of Himalayas and throughout the peninsula. Cheetal are not found in the outer ranges of Himalayas above an altitude of above 3500'. They are generally found in moist deciduous, dry deciduous, as well as evergreen and thorn forests.

Cheetal drink at least once a day and usually twice a day during the hot season. They have little tolerance for direct sun in contrast to swamp deer and black buck, cheetal generally prefer open or secondary type of forests where water can be found from streams and streamlets. Foraging meadows near the edge of the forests are good for cheetal. Sometimes they are called 'Edge Animals'. Tall grasses provide breeding places for them at the time of fawning. Cheetal is a fine feeder. It grazes and sometimes browses, depending on the type of food available. Gestation period is 7-8 months.

Sambar (*Cervus unicolor*)

Sambar has adapted itself to a wider type to forest and environment conditions. It is found in thorn forests or dry to moist deciduous forests. It ranges from the Himalayan foothills to an altitude of 9000'.

Sambar stags are usually solitary animals while hinds may be found in small groups. Stags fight for territory, each trying to hold on to some favourable valley. Sambar is a coarse feeder, it feeds on coarse blades, stems of grass, leaves and various kinds of fruits. Pairing takes place during November/December. The stag leads a solitary life after mating. Due to nocturnal habits, its propensity for remaining under cover and above all its alertness and shyness is common. Gestation period is 7 months.

Barking Deer or Muntjac (*Muntiacus muntjak*)

Muntjac is found in thickly wooded forests extending from the foothills to 9000' in the Himalayas. Barking Deer is a solitary animal, keeping mostly to heavy forest. Muntjacs are browsers rather than grazers and seek grazing spots along the edges of forests. Food consists of various leaves, grasses and wild fruits. Muntjacs appear to breed in all seasons. They are seen singly or in pairs or in small family parties. Gestation period is 6-7 months.

Swamp Deer or Barasingha (*Cervus duvauceli*)

Barasingha is generally found in marshes bordering the Himalayas and along some rivers in the gangetic basin such as the Sarda in U.P. It lives in a wide variety of forests

including dry and moist deciduous forests however, it is found primarily in open localities consisting of either marshes and grasslands or wood land with an under storey of grasses having water and also in flat to moderately flat terrain. Swamp deer is exclusively a grazer. Males fight for possession of hinds during the rutting season. Gestation period is 6-7 months. They live in herds.

Hog Deer (*Axis porcinus*)

Hog deer is found in low alluvial grass plains. It favours grass jungle, banks of rivers and open grass plains where the grass is not too high. Hog deer are generally solitary creatures but pairs are frequently seen. Hog deer like the cheetal is a lordy animal and is found in the same latitude. Males are less tolerant of each other than cheetal, at least at close quarters. Main pairing season is September and October. The gestation period is 8 months.

Black Buck (*Antelope cervicapra*) **Indian Antelope**

Black buck is found in open plains covered with scurb and cultivation. They thrive in areas covered with thorn and dry deciduous forests and avoid forests or hilly tracts. Black buck prefers open, flat to slightly undulating terrain overgrown with wide range of grasses. They are grazers and feed mainly on grass and various cereal crops. They not only tolerate direct sun much more readily than other wild ungulates in the area but, are also more diurnal in their grazing and other activities. Main rut takes place between February and March and gestation period is 6 months.

Establishment of Deer Park

The following important parametres should be borne in mind for establishing a deer park in order to achieve the best results.

1. Area

A minimum area of 10 hectares of land may be taken in its primal condition to begin with. This area should resemble an ideal habitat for animals. The area provided for various animals should be based on their ecological requirement in order to minimise the rate of infection and to meet all emergencies. High rugged terrain must be avoided. Areas having tree layer of *Albezia*, *Bauhinea*, *Ficus*, *Syxugium*, *cumini*, *Ziziphus*, *Terminalia tomentosa*, *Grewia* spp., *Cedrela toona*, *Kydia calycina*, *Mallotus philipensis*, *Embllica officinalis* with an under storey of grasses and some foraging meadows in between them, should be preferred.

Availibility of water, aspecially rivers, streams or springs in the area should be preferred. In addition tall grasses in the area can provide shelter to animals at the time of fawning.

2. Sex Ratio

We must know the sex ratio of all animals which we wish to keep in the deer park. Male to female ratio of species kept in the deer parks should be as such cheetal 1:3 Sambar 1:2, Swamp Deer 1:2, Barking Deer 1:1 Hog Deer 1:3, Black Buck 1:2.

Minimum Number of Animals Required

In keeping groups of animals, the various psychological and physiological requirements like ritualistic behaviour of the species, male female ratio, and total optimum population inside the enclosure must be borne in mind. Not more than 20 deer should be retained in the deer park. The primary aim should be to keep a group of animals rather than just a pair which will not allow social, psychological and physiological factors to have full play but will also eliminate problems in compatibility among pairs for breeding purposes and guard against risk of having only one animal left in case its partner dies.

Enclosure and Its Design

Enclosures for animals should be sufficiently large to give fullest opportunity for breeding rituals like chasing, dancing, play, exploration etc. Deer would require some rough surface to wear down their hoofs. Both deer and antelope would require tree trunks to rub against and sharpen their horns and antlers. Enclosures should have provision for hiding places and privacy according to their requirement in the shape of rocks, bushes, and tall grasses with meadows having tree groves. Enclosures should slope towards the visitors so that all animals can be seen, and enclosure surface should be such that animals can exercise, or retreat away from the visitor whenever required. Within the enclosure vegetation, soil, water, rocks, etc., must be so manipulated as to make the animals feel at home. Possibly enclosure should be situated on high grassy ground with excellent drainage, and having scattered trees for shade. Open enclosures should have shelters for protection against extremes of sun rain, hail, and wind, Shelters to which animals may be confined are essential for the maintenance of deer herds not merely for their comfort but also to facilitate the annually necessary removals. Rear of all enclosures should be camouflaged with shrubs trees, bamboos etc.

Animals should be displayed in pairs or groups according to the way they live in the wild, and also to provide companionship which may help in breeding of such species that live gregariously. These arrangements increase aesthetic values and keep the inmate in good temper. Visitors can compare and see the difference in several varieties of a species. Thus food and feeding becomes simplified for particular groups of animals. Also it becomes easy for the disposal of waste and excreta. Enclosure should be designed to keep away human beings from direct contact in order to avoid infection and communicable diseases.

Types of Enclosures

(1) *Open vast enclosure having walking trails*

Latest concept in display of animals in the deer park is by keeping vast open enclosure having fenced walking trails. Thus animals are allowed to move about freely over a vast enclosure with net work fencing. The enclosure must have a double door entrance as a precautionary measure, to prevent escape of animals. Such enclosure enables one to observe animal behaviour under more natural conditions. The walking trails should be fenced by chain link 3" $\times$ 3" mesh. Some watch towers could also be constructed to observe and study the animals in their ideal habitat and useful data could be collected in this way.

(2) *Series of Small Enclosures*

Small enclosures of 2 acres approximately area may be made for keeping the animals separately species wise, in groups, or for animals of different species in one enclosure that live together in natural conditions. Feeding becomes simplified in this way.

Fencing of Enclosure

Fencing of enclosures for a deer park consists of wire netting of oblong mesh 3" $\times$ 3" size having 9 gauge thickness chain link. The fencing should be strung, 3 meters high on stout steel posts. (65 M. $\times$ 65 m. $\times$ 6 m.m) set at 3 metre intercepts to keep away predators from the animals. Iron posts should be tilted outwards 30 cm. on the upper edge. Deer fences should be set over shallow, sunken walls of stone or interlink chain has to be embedded up to a depth of 30 cm, in concrete to keep out burrowing predators.

Quarantine

An isolation ward or enclosure should be made to segregate procured animals from display animals. New arrivals are to be kept in quarantine for a minimum period of 15 days before being shifted to display areas. Their food habits and behaviour should be observed during this period closely. In case of supply of animals from private sources, prophylactic measures should be adopted to prevent outbreak of communicable diseases.

Close Observation Area

Deer Parks should have close observation wards away from quarantine display areas, for keeping animals suspected to be having infections or communicable diseases.

Such wards should be utilised for observation and treatment of sick animals till a clinical examination pronounces them free from infectious pathogens.

All vegetation in the enclosure should be manipulated in such a way that it fulfills various requirements of different animals e.g. Foraging meadows near the edge of the

forests, providing some tall grasses for shelter and feeding and breeding place should be created for 'edge animals'.

Some animals prefer cover because of inherent shyness, altermess, and other peculiarities hence pockets of trees or groves, having understorey, should be provided common species of flora most of which should exist in the enclosure, should be in the shape of forests having understorey, open area and meadows with grasses as well as water pools in the open for their various needs.

Tree Layer

(1) Bauhinea purpurea	X	(5) Phoenix humilis	X
(2) Bauhinea racemesa	X	(6) Moghania stricta	X F
(3) Bauhinea rotusa	X	(7) Ziziphus jujuba	X F
(4) Shorea rebusta	X	(8) Bombax spp.	X F
(5) Emblica officinalis	X	(9) Dendrocalamus spp.	X F
(6) Morus alba	X		
(7) Ficus alba	X	Grass Layer	
(8) Ficus retusa	X	(1) Vetiveria zizanoides	X
Ficus gobosa	X	(2) Chrysopogon fulbas	X
(9) Kydia calycina	X	(3) Heteropogon contortus	X
(10) Grewia spp.	X	(4) Panicum milliare	X
(11) Ziziphus zuzuba	X	(5) Chloris dolichostachya logus	X
(12) Albizia procera	X	(6) Mudannia nudiflora	X
(13) Bischofia javanica	X	(7) Bothriochloa odorata	X
(14) Mallotus philipensis	X	(8) Digitaria granulasis	X
(15) Terminalia arjuna	X	(9) Themeda triandra	X
(16) Terminalia tomentosa	X	(10) Sacharum spontaneus	X
(17) Anogeisus latifolia	X	(11) Poa annua grass	X
(18) Cassia fistula	X	(12) Eragrostis gangetica	X
(19) Syzygium cumini	X	(13) Cyperus pangorei	X
(20) Cedrela toona	X	(14) Setaria glauca	X
(21) Bridelia squamosa	X	(15) Echinochloa colona	X
(22) Ougeinia oogeinensis	X	(16) Oryza latifolia	X
		(17) Fimbristylis dichotoma	X

Shrub Layer

(1) Ichnocarpus spp.	X
(2) Wrightia tinctoria	X
(3) Diospyros tomentosa	X
(4) Bauhinia racemosa	X

Forbs

(1) Blumea fistulosa	X
(2) Blumea glomerata	X
(3) Barringtonia acutangula	X

(4) <i>Crotolaria sericea</i>	X	(8) <i>Lepidagathis fasciculata</i>	X
(5) <i>Elephantopus scaber</i>	X	(9) <i>Pimpinella heyneana</i>	X
(6) <i>Lagera flava</i>	X	(10) <i>Pogostemon plectraarthoides</i>	X
(7) <i>Plectranthus incanus</i>	X	(11) <i>Triumfelta rhomboidea</i>	X

X denotes leaf eaten and F denotes fruit eaten

Feed

A monotonous and blend feed is unsuited for the continued good health of an animal and, is not conducive to their breeding either. The role of feed is of great importance in annual breeding.

Food should be varied as far as possible and should take into account (i) general requirement of individual species (ii) requirements of species preceding and during the breeding season (iii) requirements during natal and post natal period. Schedules and feeds should be varied to achieve breeding success. Usual diets are generally deficient in vitamins, minerals etc. Hence excellent feed supplements should be provided to the animals for increasing breeding potentiality. A well balanced and varied diet suited to the requirements of each species, is the best guidance for breeding success. This point should be underscored. Some animals are grazers, some browsers, and some are both grazer and browsers. So sufficient forage should be provided to meet their requirements. List of browse species and grasses, eaten by deer have already been mentioned. Fruits, leaves, and grasses are favoured and green forage has got to be provided.

Planting of such vegetation, if not already available in the enclosures, should be encouraged. Deer Parks should have arrangements to maintain their own fodder. Feeding schedules for deer are therefore fairly simple for grazers. Abundant grass should be available during summer months within the enclosures. For browsers, sufficient browse material species should be handy in the enclosure. If browsable supply species is beyond the reach of browsers, then natural growth fodder should be provided in cut form. Captive deer will not thrive on natural feed alone, hence their diet must be supplemented accordingly. Hay should be provided in racks placed high enough so that antlered bucks may not damage their antlers when feeding. Green fodder in cut-form should every day be given as such in absence of sufficient natural vegetation.

- (1) Green leaf fodder 9 kg/animal/day
- (2) Dry gram (chana) average = 200 g /day/animal
- (3) Choker wheat bran = 200 g/day/animal
- (4) Rock salt = 10 g/day animal
- (5) Linseed oil meal (Khali) 100 mg/day/animal
- (6) Cane molasses = 500 g/day/animal during winter
- (7) For pregnant does Gur in winter = 100/g/animal/alternate day

Alternate food for deer in ready-made feeding pellets manufactured by Agro is available in the market. An allowance of feeding pellets in addition to hay is superior to other meals and there is no inhalation and wastage since everything is eaten clean. Close supervision of feeding should be maintained and quantities reduced or increased as required to maintain without waste, all animals in good conditions. In order to avoid loss by trampling as well as the unsightly tangle resulting there from browse should be cut, tied into bunches and hung tips down well above the ground. Salt and mineral bricks impregnated with phenothiazine as a deterrent to gastro intestinal parasites, should be available in each enclosure. Fawns of all species are allowed to be nursed by the mother's milk. However if the mother is unable to feed her fawn with milk, then warm goat milk in a rubber nipples nursing bottle should be fed. In case goat milk is not available then cows milk should be given. Fawns begin nibbling solid food in 3 or 4 weeks and, care must then be taken that only readily digestible food is given. Calf meal moistened with milk is an excellent starter. If fawns have diarrhoea which is generally can be checked by diluting the milk with water or by the addition of lime water. Milk to fawns should be given in small quantities at intervals of from 3-4 hours at first, with increases commensurate with body growth.

Supply of Water

A clean water supply is necessary to help in preventing a number of communicable diseases, therefore pools should be cleaned periodically. Adequate provision should be made for animals like Sambar/Swamp deer to wallow. Running water in concrete troughs at all times should be ensured. Natural small pools having herbaceous vegetation should be provided in the enclosures. Number of pools in the enclosures depends upon the size of the enclosure and number of animals. Troughs, pools, and vegetation around them should be so manipulated as to make the animals feel at home. The amount availability, quality and presence of water throughout the year be ensured for the purpose of increasing deer numbers. Water holes should be designed and maintained in a manner usable by all species of deer. A water reservoir should be installed and fenced away from Human or livestock contact. For water development, plastic pipes should be preferred to galvanized iron pipe. It is cheaper, lighter and easier to lay. The pipe should be buried deep enough to escape damage from trampling by animals.

Rotational Grazing

Different enclosures should be provided by partitioning but having only a single gate system, with a view to give rest to heavily grazed areas by driving all the animals to other enclosures. Rotational grazing is carried out in such areas where animals of different species are kept within one enclosure. The closed area should be given rest till the regeneration of grasses and shrubs is attained. Keeping different species in one enclosure will help

proper utilization of the area. Cheetal is fine feeder, hence will eat only tender grasses and shrubs. Sambher is a coarse feeder and will eat only coarse grass ignored by cheetal. Similarly a new flush of leaves, after regeneration, will be consumed by the cheetal. Dense mature wood lands seldom produce a variety or abundance of desirable food plants. The diet of almost all deer includes herbaceous plants and seeds. The establishment and improvement of interspersion of herbaceous plant cover is necessary. In order to eliminate over grazing, rotational grazing is necessary. Young plants and seedlings do not develop well when cropped off or severely trampled by the animals.

Maintenance of health by hygiene

"Prevention is better than cure" holds good for the deer in parks as well. The basic requirements in this respect are:

- (1) Sufficient open space for the animals
- (2) Nutritious diet
- (3) Clean water
- (4) Proper shelter to meet psychological and physiological needs
- (5) Providing of environment close to natural habitat
- (6) Sufficient companionship for interspecific and intraspecific relationship species are kept within one enclosure. This closed area should be given rest till the regeneration of grasses and shrubs is attained. Keeping different species in one enclosure will help proper utilization of the area. Cheetal is a fine feeder.
- (7) **Sanitation**

There should be a permanent gang with proper equipment like wheel barrows for quick and efficient removal of garbage resulting from excreta of animals, left over food and used litter cleaning of excreta from enclosures will at all times minimise the risk of infection. Feed articles must be unadulterated, of good quality and in abundance. Clean water supply is necessary to help prevent diseases. All efforts should be made to eliminate parasites and pests.

Treatment and care

Knowledge regarding diseases of wild animals and their treatment is scanty at present. A good veterinary doctor should be engaged for periodical examination of animals and necessary prophylactic measures like deworming twice a year in the month of October and April, vaccination like H.S. before rains against communicable diseases etc. should be efficiently carried out. In Deer Parks, the assistance of a local veterinary doctor or some research institutions must be availed at regular intervals to carry out examination regarding the existence of parasites and pathogens and the subsequent treatment of animals.

Restraint

Prophylaxis and treatment of sick animals is made easier if methods of restraint are perfected for each kind. Isolation of an individual from a group requires skill. If the animals are habituated to come regularly for rest or food, it becomes easier to isolate sick animals. Physical force should not be normally used to capture or encage an animal as this frequently results in injury. Decoying by means of attractive feed is a safe and effective method to encage the animals. Restraint during treatment can be achieved mechanically by use of squeeze cages. The animals should be kept under observation and treated as inpatients. A proper record of observations, medications and effects, should be maintained in each case for future use.

Transport and handling of animals

The transport of animals from capture point to the Deer Park should be handled with great care. Any animal that is already weakened by shock due to its capture, should not be manhandled. Local wild animals must not be handled like any other goods. Special care should be taken while transporting the animals to their destination. It must be remembered that since animals, often in a weakened condition due to reasons stated earlier are involved, it must be ensured at all points that transit is, as rapid as possible. Delay may be disastrous. Crates should be made according to the type and size of animals to be carried. Use of tranquilisers during transport if available should be encouraged to reduce shock and mortality.

Conclusion

The spread of Deer Parks will open new vistas for the general public and bands of nature lovers; it will provide a fresh field of entertainment and study as well as some source of employment. In this age of shorter working days and longer holidays, it makes one despair to see so few Deer Parks in a country like ours which has unlimited possibilities for promoting such sources of healthy entertainment and presenting potentialities of education heretofore untapped.

As for the rest, if it be conceded that we can love our animal neighbours on this planet when we get to understand them better then, the setting up of Deer Parks is calculated to draw man and neighbouring creatures yet closer, and make his comprehension of nature more complete.

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Some Observations on the Man-Eating Behaviour of the Tigers of Sundarbans

By

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Introduction

The Tiger Reserve in the Sunderbans has a total area of 2585 sq. km and a core area of 1330 sq. km which is incidentally the largest of all the Tiger Projects in India. The last census (1979) puts the number of tigers in the Reserve at 205 which is also the highest concentration in the country. Not only it has a large population of tiger but quite a few of the tigers are inveterate man-eaters. The innumerable creeks and rivers in this estuarine habitat support a variety of fishes, shrimps and crabs. The forests are annually colonized by huge swarms of bees and a substantial quantity of honey and bees wax are harvested. The forests produce small timbers, fuel, leaves of *Nipa fruticans* and *Phoenix paludosa*. All these have lured men into the depth of these forests for eking out a livelihood since ages and this has brought man and tiger into direct confrontation in the use of this unique mangrove ecotope. But it was the tiger who had to give way all along in this unequal struggle. Project Tiger was conceived and brought into operation in this biotope in 1973-74 with a total conservation approach to allow the tiger earn a respite in his last ditch battle. But human use of natural resources cannot be wished away, particularly in a place like Sunderbans, where forests and forest produce form an integral part of the socio-economic milieu. Limited exploitation of forest produce is permitted in the buffer area of the Project and it is here that man-animal confrontation reaches its height. Recorded kills of human beings veer around 40-50 every year and notoriety of the men-eating tigers of Sunderbans comes into sharper focus. In this paper an attempt has been made to study the human kill patterns, temporal distribution of human casualties, salinity of the water (which constitutes over 60% of the habitat) and whether there is any nexus between the salinity and aggressive man-eating by tiger, and the straying behaviour a tiger which often is found to enter human habitaion crossing wide water bodies. Pattern of human entry and the nature of disturbance caused to the habitat at different times of the year for fishing, collection of wood, collection of honey and wax were also studied. Certain suggestions have been offered to minimize chances of tiger-man confrontation leading to man-eating, at the end of this paper. These are broadly based

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on the observations made so far during the implementation of the first management plan of the Project.

The habitat

The forests of Sunderbans Tiger Reserve form part of the estuarine mangrove vegetation of Sunderbans delta (the largest on globe). The forests are inundated by tidal back waters and the plant species are salinity resistant. Heleophilous Halophytes are the predominant species comprising of *Exacaecaria agallocha* (Genwa), *Ceriops tagal* (Jhanti Garan), *Avicennia officinalis* (Baen), *Sonneratia apetala* (Keora), *Rhizophora mucronata* (Garjan), *Phoenix paludosa* (Hantal), *Bruguiera gymnorhiza* (Kankra), *Heritiera minor* (Sundari), *Nipa fruticans* (Golpata). The common grass is *Oryza coarctata* on tidal mud flat and *Saccharam spontaneum* on the sea faces.

These are five different types of consociation of plants in the typical tiger habitat in Sunderbans apart from beach plantations and Saccharam covers. They are combinations of Genwa-Garan, Pure-Hantal, Baen-Sundari Kankra-Hantal, Genwa-Hantal, Pure-Garan. Amongst these, tiger's preferred den is confined mostly within the pure-Phoenix (Hantal) forests or combined with *Avicennia officinalis* and *Sonneratia apetala* which are good fodders for cheetal and food for monkey. Normally both tigers and prey animals take saline water particularly during high tide when salinity is low. But monkeys prefer to take water accumulated on the leaves of *Sonneratia apetula* from dew/rain drops.

The present animal and reptile population of Sunderbans Tiger Reserve consists of the following important species.

- 1) *Panthera tigris* (Tiger)
- 2) *Axis axis* (Cheetal deer)
- 3) *Sus scrofa* (Wild boar)
- 4) *Macaca mulatto* (Rhesus monkey)
- 5) *Felis viverrina* (Fishing cat)
- 6) *Crocodilus porosus* (Estuarine Crocodile)
- 7) *Varanus salvator* (Giant water monitor)
- 8) *Python molurus* (Indian Python)
- 9) *Lepidochelys olivacea* (Ridley)
- 10) Cobra and Krait, Rat Snakes and others.

Besides, the area has a large population of birds and water fowls, both migratory and local.

Behavioural pattern of man-eaters

The total annual number of man-eating incidence during last seven years stands as follows:

1975	...	63	1979	...	52
1976	...	40	1980	...	50
1977	...	37	1981	...	28
1978	...	48			

Thus, there occurs on an average about 45 cases of man-eating by the tigers in a year. The buffer zone of Sunderbans Tiger Reserve is allowed for fishing and honey collections. Timber felling operation in the form of coupe is also allowed. Normally man-eating incidence takes place between 7 a.m. to 9 a.m., 3 p.m. to 5 p.m. and around 11 p.m. (1) In 80% of the cases the victims were carried away by the tigers from the boats. Victims were generally attacked from behind. Practically in all the cases the attack had been on the nape and mostly from the right side. Victims were generally aged between 35 to 45 years. During the study of last few years it was also revealed that the honey collectors who usually search for honey on the land were very rarely killed by tigers. Out of 570 honey collectors only 3 persons per year were killed during 1980 and 1981. It was also observed that man-eating incidence used to be highest during pre-Project period in the blocks of Chamta, Matla and Goasaba which now form the core area of the Tiger Reserve. In the post-Project period the study of last 7 years' records reveals that frequency of man-eating incidence is increasing in the buffer zone only, confined mainly to Chandkhali, Netidhopani and Pirkhali blocks. It is interesting to note that during the honey collection season, the Haldi tower of core area reports complete absence of tigers.

Apart from these there are incidences of tiger straying inside the habitation. This straying often creates problem and in many cases they are killed by the local inhabitants brutally as an expression of their acute enmity towards the tiger. The straying also takes place in a definite mode. During monsoon and pre-monsoon showers there is very little straying. It will be apparent from the records (reference curve IV), that there has not been a single case of straying in the month of September during the last four years and very rarely during August and October.

Therefore, a trend of migration of tigers is noticed depending on the human entry pattern and Sunderbans Tigers being non-territorial in habit (3) such behaviour is quite a likely one.

Salinity of creek waters in Sunderbans is also thought to be another important factor modifying the temperament of the tigers (1). A salinity calendar has been prepared taking into consideration the peak salinity of the rivers in the biotope. In this connec-

tion it may be mentioned that there are diurnal variations in salinity during the high and low tides and therefore, only the "peak salinity" has been taken into consideration in order to fix the correct parameter. It was noticed that the peak salinity culminates during the month of May.

The analysis of man-eating propensity pattern during different seasons of the year was done over 7 years. The average frequency of man-eating incidence was found to culminate during the month of May.

The incidence of man-eating should apparently be a fraction of available human entry into the biotope. But from a curve prepared showing the frequency variation of human entry throughout the year, it appears that the human entry culminates during the month of December and is minimum during the month of May, whereas, the peak kill occurs in May and the lowest kill in the month of December. The month of April and May are incidentally the season for collection of honey in Sunderbans.

Analysis of data

From a comprehensive study of the above facts and behaviour pattern, the following factors appear to be significant.

1. Type of human entry: Human entry becomes minimum when the man-eating frequency culminates during the month of May. This obviously indicates that it is not the total number of human entry but the nature of disturbance caused to the habitat by the permit holders that matters in the tigers' man-eating behaviour. There are mostly four types of permit holders that enter the tiger habitat for exploitation of forest resources.
 - a) fishermen—They mostly frequent the small creeks and side creeks deep inside the habitat.
 - b) Coupe permit holders—they usually operate in large bodies over fixed areas, twice a year, i.e. during rains and winter.
 - c) Honey collectors—they make deep inroads into the habitat during April and May.
 - d) Permit holders collecting leaves of 'Hantal' and 'Golpatta'.

The last category of permit holders have of necessity to travel deep inside the forest in search of this particular produce, as the species occur in a scattered manner throughout the habitat. It is quite likely that in Sunderbans the availability of human beings within the tiger habitat and particularly the disturbance of the tiger's den will have certain repercussion on the tiger's aberrative trend. The season of honey collection is during the month of April

and May. The honey collectors honey-comb the Phoenix forest in quest of bee-hives and tigresses with litters are disturbed and may kill in defence of cubs or self. Thus, a tigress with cubs may kill men, initially by sheer chance and not through design. But with repetition of the incidence the tigress and its progeny become confirmed man-eaters and may even hunt man as a natural prey, on purpose. Such designed and aggressive man-eaters are even undeterred by the noise of crackers burst by the forest staff as was seen during last year's coupe work when an armed Forest Guard, on the first day of landing in the coupe, was taken away by a man-eater amidst continuous cracker bursts.

2. Salinity of creek waters appears to have a profound effect on this aberrative trend of tigers. It becomes apparent that during the month of May, the month of highest man-eating propensity, the salinity of water also culminates in the creeks of Sunderbans.
3. Disturbance of Tiger's den : Tigers preferred habitat is the forest of *Phoenix paludosa* (Hantal), pure or little mixed with *Sonneratia* (Keora) or *Avecennia* (Baen). Honey collectors and 'Hantal' permit holders particularly disturb these dens of tigers during dry seasons. Evidently December to May are the fearsome months.
4. In course of the study it also becomes apparent that a slight prey-predator gap exists in microlocalities. In the buffer zone of Sunderbans particularly along habitation, tiger inside villages. The incidence of tigers straying is maximum during February and May. Systematic release of pigs (wild strain) in such areas controlled the straying, which indicates a slight prey-predator gap in microlocalities in the buffer zone. Although the number of prey animals may be sufficient, but due to thickets of pneumatophores and muddy terrain, these are not always easily available to the tiger who may upto for easier preys. The fact is also corroborated by the faecal analysis of tiger which mostly reveals that pigs constitute the bulk of the food while deer-remains are scarce, although the number of boars are one-third of that of the deer. This is perhaps because deer are more fleet-footed.

Some suggestions in order to minimise the man-eating problem

After careful consideration of aforesaid aspects, the authors would suggest the following measures to minimize the chances leading to man-eating incidence in Sunderbans :

1. Permits for *Phoenix paludosa* (Hantal) should be stopped or curtailed to the minimum and alternate fuel arranged in order to minimize the disturbance of typical tiger habitat.

OF TIGERS OF SUNDERBANS

2. In order to segregate the man-eaters a study has been started to collect the pugmarks of the tigers responsible for each incidence of man-eating. Foot prints are being collected for identification, and are indexed centrally. It is intended to find out the exact number of man-eating tigers and their range. The confirmed man-eaters may thus be identified and isolated from the rest of the population and if necessary, be tranquilised and captured.
3. During the year 1981 a tiger Guard Head Gear has been designed with bullet proof fibre glass covering front neck and nape. It has been put to use in the field as an experimental measure. More such gears may be used if found successful.

Kill studies—1 (Spatial)

Block-wise trend of man-eating incidence in Sunderbans Tiger Reserve (1975 to 1981)

Name of Block	1975	1976	1977	1978	1979	1980	1981
Pirkhali (B)	18	10	12	10	4	1	0
Panchamukhani (B)	6	2	2	5	5	2	1
Chamta (C)	8	1	3	3	2	0	4
Harinbhanga (B)	3	5	5	6	7	8	2
Netidhopani (B)	8	2	2	3	12	18	10
Chandkhali (B)	10	14	7	6	8	2	3
Gona (B)	1	0	0	0	0	0	0
Khatuajhuari (B)	2	1	2	7	7	4	1
Arbesi (B)	5	3	4	3	2	1	0
Jhilla (B)	1	2	2	4	4	14	7
Matla (C)	1	0	0	0	0	0	0
Gosaba (C)	0	0	1	0	0	0	0
Mayadwip (C)	0	0	0	1	0	0	0
Outside	0	0	1	0	1	0	0
	—	—	—	—	—	—	—
Total	63	40	37	48	52	50	28

N.B.—B — Buffer zone

C — Core

Kill studies — II (Temporal)

Month-wise record of man-eating by tiger in Sunderbans Tiger Reserve (1975 to 1981)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1975	10	7	5	6	11	2	7	2	1	2	4	6	63
1976	9	2	4	4	4	0	2	1	1	1	4	8	40
1977	0	2	4	6	6	3	0	1	1	3	6	5	37
1978	7	6	4	5	6	6	2	0	4	1	3	4	48
1979	3	4	3	7	11	4	2	4	2	3	6	3	52
1980	4	3	6	4	10	3	1	2	3	3	6	5	50
1981	3	22	4	5	3	1	1	1	2	2	2	2	28
	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	36	26	30	37	51	19	15	11	14	15	31	33	318
Yearly Average Number	5	3.7	4.3	5.3	7.3	2.7	2.1	1.6	2	2.1	4.4	4.7	45.4 or say 45

Salinity variation (Temporal)

Record of seasonal variation of peak salinity in the creekwaters of Sunderbans Tiger Reserve

Months	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Highest salinity	1.90	2.35	2.35	2.55	2.83	1.90	1.80	1.80	1.25	0.96	1.05	1.50

of water
recorded
in salt.
P.C.

Straying behaviour (Temporal)

Record of tiger straying within the habitation adjoining Sunderbans Tiger Reserve (from May/77 to May/81)

Months	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Frequency of straying over 5 years	3	4	3	1	3	2	1	1	0	1	2	3	= 24

A.V./Year

5

Human use of biotope

Record of human entry (permit holders) in the Sunderbans Tiger Reserve. (Monthly average over 5 years from 1977-1981)

Months	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Nos.	512	637	380	215	204	358	385	321	459	444	762	803	

4. In order to meet the prey-predator gap, systematic release of wild strain of pigs kept in the departmental piggery should be undertaken. It was revealed on the first year that about one pig is required per 10 sq. km. area of buffer zone. During the year 1981 a more close circuit observation was done within the Sajnakhali Wild Life Sanctuary consisting of an area of 362 Sq. km. 12 pigs were released during the year. The number of man-eating incidence has decreased to two in the Sanctuary 1981. Thus study is being continued. But this release appears to have had a good effect on the cases of tiger straying which has been remarkably reduced to two only during the whole year.
5. Effective tranquilisation of tigers straying out in the villages is necessary to win goodwill and confidence of the people. Prompt tranquilisation of three tigers in the recent past have generated a sense of assurance in the minds of local people. Therefore, more trained hands and equipments would be needed.
6. An experiment has already been started to build up apiary at controlled location within the forest by setting up bee-hive, sprinkling with last year's collected honey. But the Sunderbans honey-bees belong to the species *Apis dorsata* which are not drawn to the apiaries raised like *Apis indica*. The results are yet to be ascertained.
7. Since sweet water ponds dug earlier in the project have been found to be the favoured environmental type for both the tiger and prey species, more of such environmental types in the core area may be created to draw away the tiger from the buffer zone. Six sweet water ponds have been dug in order to meet the need of sweet water and attract tiger inside the core area. It was observed that pugmarks of several tigers could be found out on the banks of sweet water ponds which indicates their liking for the same. There is a plan to increase the number of ponds in future.

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Alarm Calls

By

GIRI RAJ SINGH

A person spending any appreciable length of time in the Indian Jungle, specially in areas rich in wildlife—has to be either unfortunate, or singularly unobservant not to come across instances of creatures of the wild, giving their “alarm-calls”. Such calls are given by animals and birds to indicate the presence of predators, specially the greater cats, the tiger and the leopard and act as warning signals. Various species of birds and animals have their own characteristic alarm-calls, which form a part of the universal language of the jungle at large; the significance of these calls is clearly understood by most creatures. In years gone by, when sports-hunting was permitted and popular, it was considered essential that for a sportsman to be successful, he should be well versed with all the jungle sounds and calls, and specially so in the correct interpretation of the alarm-calls. This not only helped the hunter to locate his trophy, but at times warned him of danger from unexpected quarters, while engaged in following up dangerous and wounded game. It normally required considerable time, patience and perseverance, for a person to thoroughly acquaint himself with this particular aspect of animal behaviour. First of all, it was necessary to correctly establish the identity of the creature giving the alarm-call, to learn and understand the habits and behaviour of the animal concerned, and above all to correctly evaluate the degree of reliance that could be placed on the calls. For example both the Rhesus and the Langur monkeys, commonly found in the jungles, have an equal advantage of timely detection of the presence of a marauding predator, from their tree top perch. Yet, the screeching and chattering alarm-call of the Rhesus is far less reliable than the choking-cough call of their black faced brethren. The Rhesus is much too excitable, and is liable to start calling on the slightest suspicion of danger: This monkey is quite familiar, in fact too familiar at times, with human beings and dogs, round about villages and towns but in interior forests, it is not at all uncommon for the Rhesus to start off its alarm-call at sighting a dog accompanying a wood-cutter or a sportsman. The sight of a hunter wearing a camouflaged jacket, or any clothing the colour of which even remotely resembles the markings of a leopard or tiger, is enough to get the Rhesus started on its chattering. When a troop of these monkeys spot one of the greater cats, they rush down from their safe perch in a tree, and run over open ground to climb another tree and that is when their arch enemy the leopard, has a good opportunity to grab a meal for himself. As against this idiotic and unreliable behaviour of the Rhesus monkey the Langur presents quite a different picture. These larger monkeys are not so excitable, and only give their alarm when

the presence of the predator has been definitely established. In a troupe of Langors, normally one of the older females takes up a guard or watch position, while the rest of them are feeding. It is usually this experienced old female that gives the first indication of danger, and the call is soon taken up by the entire troupe. When the calls of the Langur continue for even ten minutes, there is no doubt that a tiger or leopard has been sighted. However, the Booming call that some of the bigger bull Langors are in the habit of giving out at times perhaps just for the fun of it is not to be confused with their Alarm-call.

Another alarm-call, almost as reliable as that of the Langur monkey, is that of the lordly Sambar, India's largest deer. The loud resounding "Dhenb" can be heard over long distances. It is a jungle sound that stir the feelings of all outdoor men, not only with its implied presence of the greater cats, but just the music of it. The call of the Sambar has quite a few variations, but the identity of the caller remains unmistakeable. The call of the female is a bit different to the stag's. At times the Sambar's alarm-call does have a sort of metallic sound to it, but it takes some fanciful imagination to compare it to the sound of a bell. It is difficult to understand the reason why the British Sportsmen referred to the call of this deer as the "Belling" of the Sambar. But stranger still is the belief and contention of some older British Sportsmen: that a tiger at times imitates the alarm-call of the Sambar, in order to lure the deer closer for a kill. A tiger certainly does possess a large repertory of calls, but it is doubtful if it could imitate a Sambar so well as to fool the deer with the call of its own kind. Then, why the Sambar alone? If a Sambar could be thus induced to come near, why not other deer too? Besides, why would a Sambar be attracted to the alarm-call of its own species. This call, meant as a danger signal, would only help to alert the deer and make it more wary. It is most surprising how the old timers, who were usually such keen naturalists and observers, could come to this most unusual conclusion about the Sambar's call and the behaviour of the tiger.

It is a pity that nature has afflicted a handsome deer like our Swamp deer, with vocal chords capable of uttering such horrid calls. For, the alarm-call of the Swamp deer is such, that even the most ardent of animal lovers would shy away from it. It comprises of a braying sound, plus a whole cacophony of equally unpleasant, and rather undecipherable sounds. In the manner of other deer that herd together, the Swamp deer also tend to bunch up when faced with a tiger or leopard. Like other deer too, they stamp their fore foot when giving their alarm-call. In a much publicised book by one of our so called conservationists, the writer mentions that the Swamp deer are so stupid that when faced with a tiger, they stand around in a daze, to be picked off at its convenience by the great predator. No doubt, this writer has picked up this point from the writings of an old British Sportsman of long ago, who mentions just one such instance, which curiously does not turn this odd behaviour of a few individuals, into a universal and well accepted habit of this species of deer.

The most commonly heard alarm-calls, are those of The Chital (Spotted deer) as this is still the most numerous of our deer. The call consists of a high pitched and sharply uttered "Pao". It is sweet music to an old outdoor-man's ears, to hear a herd of Chital in full cry. The heavier sounding calls of the stags clearly stand out from the shrill ones of the Does and immature males. Since these deer normally call in a herd, their alarm-call can always be considered as most reliable indication of the presence of predators.

The alarm-call of the Hog deer, is not too different from that of the Chital; except that more often than not, it is given by a single animal, as the Hog deer do not go about in herds. The call is often and of a higher pitch, and somehow has a sad and lonesome quality to it. It also has a slight ventriloquistic effect even when given at close quarters, it appears to come from far off and from a slightly different direction to its actual location.

The little Barking deer is well named, as its alarm-call is not too unlike the bark of a dog. short sharp barks given at regular intervals, and repeated more quickly when the deer runs off. It also gives a series of clicking sounds when running. Some claim that these sounds come from the hooves hitting against each other actually these strange sounds are made by the deer clicking its teeth. This little deer is one of the few wild creatures that habitually sneak about in thick under growth, so it is not surprising that this deer is one of the first to catch sight of a predator lurking in the heavy cover. However, the Calls of this deer are usually not considered too reliable, as this little creature is much too timid and highly strung. It is said that at times, it starts off with its calls on hearing the sound of its own droppings falling on dried leaves.

When "The Pheao" calls, the whole jungle goes quiet, even the insects quit for a while or so it seems. For, the alarm call of the Jackal has a sinister and a strange weird quality to it. The sound is a long drawn out "Phee-aa-o", interspersed at times with short sharp barks. Although the Jackal is perhaps one of the very few creatures, who are in constant touch with leopards and tigers, as these scavengers greatly depend on the predators for their daily meal yet strangely enough, the alarm-call of the Jackal is seldom heard. Why this little creature should keep quiet most of the time on seeing the greater cats, is a mystery, but why it should give tongue once in a while only, is even a greater mystery. Incidentally the word "Pheao", undoubtedly derived from the sound of its call, is the name given by the local forest villagers, to the Jackal that gives the alarm-call.

The larger animals are the ones that predominantly give alarm-calls in the jungle but the various species of birds too, constantly give away the position of the predators. One of the most reliable callers amongst our feathered friends, is The Peacock. However, one has to know this bird well, not to mix up its two alarm-calls with very similar ones that are given when this bird takes to the trees to roost for the night. Somewhat similar is the

position of the Jungle-fowl (Jungle-chicken) the ancestor of all domestic chickens. This bird gives the typical cackling call so common to barnyards on seeing the predators. But, to confuse the issue, the same call, call it an alarm-call or not becomes so sickeningly common during the breeding season of the Jungle-fowl in February to April, when the romantically inclined Roosters pursue the hen of their choice. The Jungle Babblers, commonly known as "Seven Sisters" at times go out of their way to make life miserable for any predator that is foolish enough to come into their line of vision. These birds not only create a terrific racket, but persist in flying from tree to tree, along the path taken by the predator, thus giving away its position.

The birds have the added responsibility of keeping a lookout for the predators of the air. The Raptors. To distinguish when a bird or group of birds are calling on a predator of the jungle, or on one from the air, requires quite a bit of knowledge and experience, not only of birds in particular, but of wildlife in general, but this is what makes outdoor life so interesting.

On scenting or sighting one of the greater cats, the Elephant appears to feel, that it is in imminent danger of being slain and carried off to the nearest bush to be devoured. At least that is the general impression one gets, at the tremendous noise, fuss and demonstration put up by this large beast. Trumpeting shrilly, the elephant bangs its trunk repeatedly on the ground, producing a strange metallic sound. It kicks the earth sending up clouds of dust, and occasionally lets out a loud bellow. All this can hardly be termed an alarm-call, but can certainly be classified as an alarm-signal. The elephant repeats this performance at the sight of a snake too. There seem to be no recorded case of an elephant dying of snake bite. The snake would literally have a tough time in getting its fangs into the elephant skin. But probably if a large Hamadryad (King-cobra) did manage to bite, it may not kill the elephant, but would certainly make it feel a bit sick for a while. It is a significant fact, that practically all birds and beasts give alarm-calls on the snakes too.

It must not be imagined, that with all these alarm-calls being constantly broad-cast all over the jungle, the creatures must have an extremely tough time, faced with prospects of sudden death at any moment. With all birds and animals, the old philosophy of "out of sight-out of mind" holds good. Once the immediate danger is passed, they forget all about it, and go about their normal tasks of every day life. Another very pertinent fact is, that by some unknown instinct or some form of telepathy, all the creatures large and small, appear to be aware when to take precautions for their safety, and when to relax even in the face of apparant danger. They seem to know when a predator is on the look out for a victim, or when the same predator has had a meal and is not likely to attack them. This explains the reason why at times, a bird or animal will not give an alarm-call even when their enemy is in full view; while at other times, just a glimpse of the dreaded foe gets them all worked up, shouting blue-murder.

Seasonal Migrations of Gaur (*Bos gaurus* H. Smith)

(A comparative study between observations at Gaurimara, Wildlife Sanctuary, West Bengal and Megpal and Bamni in Rairkhol, Orissa)

A.R.H. BULU IMAM

Hitherto the seasonal migration of Gaur in recent observations has been attributed to temperature variations and precipitation (rainfall) factors (Guin—Pal, Cheetal Vol. 23, No. 3; West Bengal); (Prater, 1971, Karnataka); (Shahi, 1977, Palamau); (Schaller, 1967); (Johnsingh, 1979).

I have, however observed migrations of Gaur herds and single adult bulls in the Rairakhol area of Orissa adjoining Sambalpur range, in the forests between Megpal (partly in Sambalpur Range), and Bamni in the Rairakhol Range. The distance across forests between the two areas is roughly 25 km. Here the Gaur started to leave Megpal hills around March, returning during July. From July to February they stayed in Megpal. However, during November I observed several lone adult bulls, and a very large herd (approximately 35 animals) up on the hills of Geriakgamand north of Bamni, which might have been a separate group to those of the Megpal range.

With regard to the present study, the bison began to leave the hill ranges of Megpal around mid-March, returning there in July. In July to February they stayed at Megpal. During the hot summer months the water reserves of Megpal dried up causing the exodus to Bamni where there was water supply available in the forests. However, Megpal is more hilly than Bamni, coinciding with the earlier observation of Gaur leaving for hilly ranges with the advent of the heavy rainfall, especially the monsoons. The main difference over here is the early migration of the Gaur before the summer for reasons of availability of drinking water supply, and subsequent return with the start of the monsoons rain. Whereas in other places (Garumara, Palamau, Karnataka) Gaur have been observed to stay away from the plains for four months on the higher ranges during the rains and returned for the balance eight months to the level land (i.e. July-October) in Rairakhol I observed that the Gaur stay away from the hill ranges for only four months during the summer, and spend the balance eight months up in the hilly ranges (i.e. July to March). It is of interest to note that their arrival and departure in the plains occurs in the opposite phase as observed at Garumara (i.e. 86 deg. Fahrenheit leaving for the hills) since it gets hotter with their coming down in mid-March.

The seasonal migration of Gaur as being mainly altitudinal in nature and associated with the physical factors of nature regulating the distribution and abundance of food plants (Guin—Pal, 1982), and other such attributed causes as the biting of insects (Meagher, 1973), will upon close examination found inconclusive. Meagher's investigation anyway was with reference to a study of the North American Bison.

The reason for the migrations of Gaur cannot be solely attributed to the direct causes of temperature variation, rainfall precipitation, altitudinal factor or food supply. The factor of inadequate supplies of drinking water must be considered also.

While it was observed at Gaurumara (Guin—Pal, *Cheetal*, Vol. 23, No. 3) that the departure of Gaur from the sanctuary area was at a maximum temperature of 86 deg. Fahrenheit in July, and that the return of these animals from the Bhutan foothills was at this same mean temperature during October, it possibly indicated a preference by the Gaur for a cooler climate. However, as earlier pointed out in Sambalpur/Rairakhol area of Orissa under study the migration up to the hills from Bamni though being at a slightly higher minimum temperature was reserved in the return migration in mid-March from this temperature to a considerably hotter one during summer in the Bamni plains jungles (90-100 degrees Fahrenheit), although the migration period itself was at around the same mean maximum temperature of 86 deg. Fahrenheit when leaving Bamni, as well as when returning from Meghal down to the plains.

From the foregoing observations of Gaur in Gauramara, Rairakhol, etc. it will seem that (a) Gaur like to get away from areas of excessively heavy rainfall, especially if there is soft soil such as black-cotton, etc. and, (b) that they prefer a cooler climate to the hot and humid plains during summer months or monsoon months, and (c) that they will perforce endure the dry heat of the plains as in Rairakhol, or the humid heat even of such places as Gauramara solely for purposes of obtaining, in the former a drinking water supply, and in the latter, better pasture. The conclusion of the Guin—Pal survey (*Cheetal*, Vol. 23, No. 3) that the seasonal migration of Gaur is mainly altitudinal, along with physical factors affecting the distribution of food plants (Allen, 1876), is questionable in the light of the foregoing observations. It is also pertinent to consider the following observations (Imam, 1985):

That the heat has absolutely nothing to do with the seasonal migrations of Gaur, since in the following places they stay during summer temperatures of 90-105 degrees Fahrenheit, by choice: Chanda (M.P.), Rairakhol, Dhuanali, Berbera (Orissa), Bandipur (South India). With reference to Duanali which adjoins Berbera in south-eastern Orissa, the jungles are heavily stocked with Gour. However, there is no seasonal migration during the hot summer months up to the adjoining Bhaisa-Lotan plateau at 3,000' altitude, where temperatures are considerably cooler. Variation of temperature will be seen to have no

direct cause in the migration of Gaur, and may be considered merely as an indirect *effect* of other crucial factors.

In Bandipur (South India), there is extreme shortage of water during the summer and the Gaur migrate to the Mudumalai sanctuary region where a supply of drinking water is available. In Assam along the Brahmaputra Valley and the West Bengal Dooars and parts of NEFA, the Gaur come down from the adjacent Bhutan hills to avail of the better grazing pasture available in the lush flatlands of the tea belt, evergreens, what was once the *Teraï*, and semitropical belts. Gaurs are essentially hill-dwellers and used to hard, firm ground. During the heavy monsoons in these regions the clayey black cotton soil becomes unsuitable for the sharp, pointed, and relatively small hooves of the heavy one-ton Gaur, and naturally these animals seek the higher and drier ground from which they have come down. The ensuing migration of Gaur (such as in Gauramara) has nothing whatsoever to do with seeking better feeding grounds, since, in fact, the pasture in these plains lands are far better during the monsoons and vastly superior to the food available up on the steep Bhutan hills. The migration, as pointed out, is solely to obtain a footing on firmer ground.

In the high ranges of Travancore where one gets Gaur up in the tall grass of the rolling hill *maidans* at altitudes of up to 8,000', the winter temperatures are bitterly cold, dropping to near freezing. Yet, there is no migration.

As seen, the migrations in Gauramara and elsewhere in Assam and NEFA are due to unsuitability of bison hooves to the wet, clayey soils; and the migrations in Rairakhol and Bandipur are in search for drinking water during summer. This is borne out by Prater (1971).

"Though Gaur come down to low levels at certain seasons in quest of pasture, they are essentially hill animals".

Further, note may be made of the fact that when a Gaur population leaves a forest during the monsoon months, as in Gauramara and other contiguous areas in Assam and NEFA, it vacates a good grazing ground which is immediately taken over by cattle graziers with their herds of domestic animals, accounting for the infecting and spreading of the highly contagious foot-and-mouth disease or Rinderpest which is common among domestic cattle, and is the worst known killer of ungulates and large bovines. I have been witness to unprecedented epidemics in which several hundreds of Gaurs died in Raimona (Assam, 1967) in the Bhutan foothills of Northern Goalpara, and once again in Rairakhol in the Bamni area (Orissa, 1972), and again in Berbera and Dhuanali (Orissa, 1963) while overstocking is the classic cause of Rinderpest it is to be remembered—that it is spread through domestic cattle.

An understanding of the migratory movements of Gaur populations and a systematic control of their populations to obviate any overstocking, along with a protection of their natural habitats from contamination by herds of domestic cattle, will undoubtedly lead to more healthful conditions for this most magnificent of Indian bovines.

An interesting sidelight of the Gaur is that though the accepted relation of bulls to cows is 1:2 (Belsare, Chandiramani, Dutta, 1984), it has been observed that the male, female calf ratio is, however, 1:1. This had been put down to selective predation and bull combat mortality (Belsare, Chandiramani, Dutta, 1984). The reason is obviously otherwise. The cause for higher mortality rate of bulls is that the bulls lose all sexual interest at a comparatively early age (Brander, 1923), and go out of the herd to lead a solitary life at this time. While young bulls are often found in pairs, old bulls are always found alone (Forsyth, 1889). Hence, losing the collective protection of the herd these animals, especially when young, are far greater prone to become victims of predators such as tigers who kill them by first hamstringing them and bringing them down. It is likely that the herd size is determined by the animals' defence requirements as well as by foodstocks (Belsare, Chandiramani, Dutta, 1984). The larger numbers of Gaur killed by predation are victims of tigers. The study of faecal samples from tigers showing 2.6% Gaur being killed by tigers (Belsare, Chandiramani, Dutta, 1984) is misleading since the samples were obtained during summer by waterholes when the animals were in herds and in a greater defensive strength collectively. The Gaurs killed by tigers are mainly the young pair bulls, the singles, and the old lone bulls. However, polygamous by nature the bull Gaur in a herd are capable of maintaining the prolificity of the numbers. Unlike some other herd animals, such as the elephant, Gaur do not drive other bulls out of a herd to gain supremacy over the cows, but such bulls remain on the periphery of the herd. Even though the bull Gaur ratio is seemingly low, in view of the foregoing the culling by nature seems to be a natural balance, and lone animals are of no importance to the herd.

Bulu Imam,

"The Grve",

Hazaribagh-825 301, INDIA.

A Study of Sexual Dimorphism in *Barilius bendelisis* Hamilton (Cyprinidae, Cypriniformes)

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Introduction

Sexual Dimorphism in fishes is an important phenomenon which is particularly useful to fishery biologists engaged in artificial breeding.

Canestrini, (1872), Andres, (1897), Arnold, (1911), Hora and Mukerji, (1931, 36), Hora and Misra, (1936), Misra, (1938, 50), Hora, (1939), Hora and Law (1941), Chacko and Venkataraman (1948), Raj (1955), Parameswaran *et al.* (1969), Tilak (1971, 73), Desai (1973), Chaturvedi (1974), Pathani (1978), Joshi (1981), and Grover and Tripathi (1982) have studied this aspect in Cyprinids and these studies should be helpful in this direction.

Although *Barilius bendelisis* Hamilton grows to a small size, yet it is captured and consumed by a large section of poor people and can be grouped as a commercial fish of the second degree. The knowledge of the sexual dimorphism in this species is important both from fishery and taxonomic points of view because the male of this species has been treated as a separate subspecies *Barilius bendelisis* Chedra (Ham) in the past. Tilak (1971) has studied the sexual dimorphism in this species and hinted at the possibility of solving taxonomic problem in the species through study of these characters. At this stage, therefore, it is necessary to work out the sexually dimorphic characters of *B. bendelisis* Ham. in detail and here these are described in this paper.

A large number of examples of both sexes of *B. bendelisis* Ham., comprising a large number of populations from various water ways of Doon Valley were examined for this study. The collections were made throughout the year at weekly intervals.

Observations

The basic description of *B. bendelisis* Hamilton has been taken from Hamilton (1922) and Day (1878). Sexually mature specimens of this species were examined for sexual dimorphism and it was found that sexual dimorphism prominently occurs in *Barilius bendelisis* Hamilton.

The morphological differences in males and females of *B. bendelisis* are tabulated Ref. (Table I) and (Fig. I and II).

Table IMorphological differences in Males and Females of *Bariltus bendelisis* Hamilton*Males*

1. Males are larger in size and more in weight. The size of the mature males ranges between 11.8 cm to 15.9 cm and the weight ranges from 19 grams to 52 grams.

2. The eyes are larger than females (diameter of eyes are contained 5.2 to 6.6 times in the head length).

3. Males are brightly coloured with golden yellowish operculum, greenish snout and orange coloured lower jaw. There is larger orange tinge on the paired and the anal fins, a yellowish shade on the caudal fin with black margins.

4. Males have prominent tubercles on the tip of the snout, and the whole of the ventral side of the lower jaw.

5. The pectoral fins are fan like with first three fin rays very well developed and stout and in extended condition these rays are widely apart.

6. The height and the width of the pectoral fins is more than females and the height of the naked part of the pectoral girdle is also more than females (height of the naked part of the pectoral girdle is contained 1.38 to 1.76 times in the height of body).

7. The pectoral girdle is well developed, wide. The black band on this girdle is more prominent.

Females

1. Females are smaller in size and less in weight. The size of the mature females ranges between 9.0 cm to 12.8 cm and the weight ranges between 9 gm to 22 g.

2. The eyes are smaller (diameters of eyes are contained 4.0 to 5.2 times in the head length).

3. Females are not brightly coloured. The dorsal and caudal fins are yellowish with blackish edge and other fins are whitish tinged with orange.

4. Tubercles are less prominent and very few in number.

5. The pectoral fins are triangular, fin rays are not much developed and the distance in between two fin rays is less.

6. The height and the width of the pectoral fins is less and the height of the naked part of pectoral girdle is also less than males (height of the pectoral girdle is contained 1.57 to 2.21 times in the height of body).

7. The pectoral girdle is not much developed. The black band on this girdle is not so prominent.

8. The body is rough due to the presence of small tubercles arranged in two irregular rows on each scale.

9. The fin rays of the ventral fins are more developed and widely apart in life.

10. The black spots present on the scales are darker.

11. The anal fin contains 8 branched and three unbranched rays.

12. The ventral profile is straight.

8. The body is smooth and no tubercles on the scales are present.

9. The fin rays of the ventral fins are not much developed and widely apart in life.

10. The black spots on the scales are not so dark.

11. The anal fin contains 9 branched and three unbranched rays.

12. They have distended bellies.

Apart from the above mentioned points, the males and the females of *B. bendelisis* Ham. have the following differences in their morphometry.

Table 2

Morphometric differences in males and females of *Barilius bendelisis* Hamilton.

Males

1. The head length is contained from 4.8 to 5.07 times in the total length.

2. The diameter of eye is contained 5.0 to 6.6 times in the head length.

3. The height of head is contained from 1.17 to 1.56 times in the head length.

4. The width of body is contained from 6.68 to 7.95 times in the total length.

5. The height of the naked part of the pectoral girdle is contained from 1.38 to 1.76 times in the height of body, 5.88 to 6.94 times in the standard length and 1.38 to 1.64 times in the head length.

Females

1. The head length is contained from 4.6 to 6.4 times in the total length.

2. The diameter of eye is contained 4.0 to 5.2 times in the head length.

3. The height of head is contained 1.10 to 1.46 times in the head length.

4. The width of body is contained from 7.14 to 9.0 times in the total length.

5. The height of the naked part of the pectoral girdle is contained from 1.57 to 2.51 times in the height of the body, 6.57 to 7.69 times in the standard length and 1.64 to 1.91 times in the head length.

It is clear from the above observations that there are clear morphological and morphometric differences in males and females of *Barilius bendelisis* Hamilton.

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Note:—References marked with asterisk (*) are not consulted in original.

Abnormal Behaviour of Chir (*Pinus roxburghii*) in Parvati Valley in the Kulu Himalayas (H.P.)

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The Parvati Valley is a narrow V-Shaped Valley, carved by the river Parvati into the sub-strata of Quartzite in its lower reaches and of mica and biotite Schist and Shales at higher levels. The direction of the Valley is SE-NW between Khirganga and Manikaran and NE-SW between Kasol and Jari. The Parvati river is still young and actively cuts its way into the rock, resulting in deep gorges in Quartzite country. The alluvial deposits, are variable in composition, from sand to clays and provide in this area, some of the best agricultural lands of high fertility.

The structure and composition of vegetation at any place is a function of the locality factors viz. climatic, edaphic topographic and biotic. Changes in any one, or a group of these factors, results in vegetation unique to that locality. Further there is an altitudinal zonation of vegetation in the hills and accordingly a set of coniferous species mixed with broad leaves are found at fixed altitudinal Zones.

Pinus roxburghii is a species found in the Sub-Himalayan tract and outer Himalayas as far east is Nepal, forming extensive pine forests from 500 m. to 2160 m, and occasionally to 2500 m. It is found the Sub-tropical Zone in the upper reaches of the mixed deciduous forests and in the lower reaches of the temperate Zone below *Cedrus deodar* (Deodar), *Piscea smithiana* (Srna) and *Abies pindrow*, (Fir). However in Parvati Valley in H.P., the behaviour of Chir is abnormal with respect to the altitudinal Zonation and Chir is observed above Deodar and this is evident at Kasol, situated in the Parvati Valley.

In the Parvati valley of the Kulu Himalaya, both Xerophilous and hygrophilous Communities are found on the same aspect, and Chir pine which is usually found on the warmer Southern aspects is found on northern aspects. This indicates that there is another more potent factor, than aspect which determines the distribution of this specie.

Chir pine in the Kulu Himalayas occur on Skeletal or immature Soils while Blue pine (*Pinus wallichiana*) and Deodar (*Cedrus deodar*) are found on the best developed podsolic profiles in the area under uniform climatic conditions. The maturity of the Soil is a function of climatic and geological formation. Assuming that the climate is uniform in the valley, it is the geological features of the area, which determines the maturity of the Soil, and hence the forest types.

The effect of rock, on surface vegetation is two fold: (a) Lithological and (b) Structural. The Lithological effect is exhibited, by the presence or absence of mineral elements in the rock. The structural effect by way of ip and Scarp determines the moisture content, base saturation, pH etc. The dip slopes are rich in mineral water, while the scarp slopes in leached hf mineral salts, which seeps in the direction of the dip of the Strata of the rock. Therefore the Soils on dip slope are expected, to have better moisture content as compared to that on the Scarp slope.

The dominant rock between Jari and Manikaran is quartzite, interbedded locally with thick bands of mica schists, phyllites, sandstones and shales. The strata of the rock dips towards NNE. The S-W tides in all side valleys are therefore scarp slopes while dip slopes are on the N-E sides. Both sides in the Parvati valley between Jari and Manikaran are scarp faces.

Topographically, Scarp slopes in the area are steep and precipitous and Soil seldom, collects in appreciable quantity along them. At lower levels, scree, chiefly consisting of large blocks occur and there too are mostly unstable. The dip slopes, are invariably gentle, and are topographically stable.

The Quartzite rock is poor in Calcium Salts, hence Soil on Scarp slopes are usually base deficient and dry, while those in dip slopes, are less base deficient, and moist. This is evidenced by scarp slopes being often bare and supporting only stunted trees of Chir pine, while dip slopes have good forests of Kail (*Pinus wallichiana*) or Chir-Kail Community in developmental stages. The alluvial deposits near the base of the river, are very fertile and supports some of the best forests of Deodar and Kail. Freshly laid deposits, bear groves of *Alnus nitida* accompanied with *Aesculus indica*, populus, *Quercus dilatata* etc.

Thus the abnormal behaviour of Chir, in the Parvati valley of Kulu Himalayas, can be basically ascribed to the edaphic factors arising out of the geological formations, in that region. This is a clear example of how the vegetation, at any place is a function of the edaphic factor, resulting in the aberration in the altitudinal Zonation in vegetation.

दुर्लभ वन्य जीवों को बचाइये

रामेश बेदी

प्रकृति हमारे देश पर बहुत उदार रही है। हमें यहाँ ठण्डे और गरम सभी प्रकार के जलवायु मिल जाते हैं। उफ़नती हुई नदियों, शान्त झोलें, अथाह गहराई के समुद्र, वरफ से ढके पहाड़ों की सफेद चोटियाँ, घने जंगल - प्रकृति की सभी आकर्षक चीजें यहाँ मौजूद हैं। हमें इस बात का गर्व है कि पशु-पक्षियों की बहुत अधिक जातियाँ हमारे देश में पाई जाती हैं - पाक्षियों की करीब दो हजार जातियाँ और स्तनपायी जानवरों की पाँच सौ जातियाँ। कीड़ों और पतंगों की तोस हजार जातियों का कोट विशाल भारत में पता लगा चुके हैं। रेंगने वाले जीवों और मछलियों की संख्या इन से अलग है।

अश्वमेध यज्ञ—राष्ट्रीय पशु मेला : जंगल के जीवों को समझने और उन्हें मनुष्य के अधिक नज़दीक लाने का सर्वप्रथम श्रेय हमारे क्रान्तदर्शी ऋषियों को दिया जा सकता है। वैदिक काल में वे एक राष्ट्रीय यज्ञ किया करते थे। जिसे अश्वमेध यज्ञ कहा जाता था। इस यज्ञ में भारत के कोने कोने से जंगली और पालतू पशु ला कर प्रदर्शित किये जाते थे। इन में हाथी और गेण्डे जैसे महाकाय जानवर, बाघ और गुलदार जैसे हिंसक पशु, चीतल और नीलगाय जैसे तृण भोजी, मगर और कछुए जैसे अर्द्ध जलचर जीव, अनेक प्रकार के पक्षी और कीट पतंगों की कई जातियाँ होती थीं। इस महायज्ञ में लाये जाने वाले प्राणियों की कुल संख्या छह सौ नौ थी। यजुर्वेद के चौबीसवें अध्याय में इन पशु-पक्षियों के नाम गिनाये हैं और इन के रूप-रंग का भी वर्णन किया है। इस राष्ट्रीय पशु मेले को समाप्ति पर सभी वन्य जीवों को जंगल में मुक्त कर दिया जाता था।

धर्मारण्य कौटिल्य : जंगली जीवों के संरक्षण की भावना हमारे देश में इतनी व्यापक हो गई थी कि जगह-जगह ऐसे स्थान सुरक्षित कर दिये गये थे जहाँ उन का शिकार करना या उन्हें किसी प्रकार से सताना बिल्कुल बन्द था। जंगली जीवों का संरक्षण एक पुनीत धार्मिक कर्तव्य हो गया था। इसी लिये ऐसे जंगलों को धर्मारण्य या अभयारण्य कहते थे। ईसा से करीब तीन सौ साल पहले पाटलिपुत्र (वर्तमान पटना) के प्रधान मन्त्री कौटिल्य ने अपने अर्थशास्त्र में लिखा था कि उन अभयारण्यों में पेड़, बांस, बेंत और घास काटना, पत्ते तोड़ना, ईंधन काटना, लकड़ी जला कर कोयला बनाना, जानवरों की खालें निकालना और हड्डियाँ बटोरना कतई मना था। इन कामों से वन्य जीवों के सामान्य जीवन में खलल पड़ता है।

तीसरी शताब्दी ईस्वी पूर्व में सम्राट अशोक ने शिकार करने पर पाबन्दी लगा दी थी। २४२ ईस्वी पूर्व में अशोक स्तम्भ के पांचवें आदेश में सम्राट ने कुछ पक्षियों और पशुओं के नाम खुदवाये थे

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Abnormal Behaviour of Chir (*Pinus roxbughii*) in Parvati Valley in the Kulu Himalayas (H.P.)

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The Parvati Valley is a narrow V-Shaped Valley, carved by the river Parvati into the sub-strata of Quartzite in its lower reaches and of mica and biotite Schist and Shales at higher levels. The direction of the Valley is SE-NW between Khirganga and Manikaran and NE-SW between Kasol and Jari. The Parvati river is still young and actively cuts its way into the rock, resulting in deep gorges in Quartzite country. The alluvial deposits, are variable in composition, from sand to clays and provide in this area, some of the best agricultural lands of high fertility.

The structure and composition of vegetation at any place is a function of the locality factors viz. climatic, edaphic topographic and biotic. Changes in any one, or a group of these factors, results in vegetation unique to that locality. Further there is an altitudinal zonation of vegetation in the hills and accordingly a set of coniferous species mixed with broad leaves are found at fixed altitudinal Zones.

Pinus roxbughii is a specie found in the Sub-Himalayan tract and outer Himalayas as far east is Nepal, forming extensive pine forests from 500 m. to 2160 m, and occasionally to 2500 m. It is found the Sub-tropical Zone in the upper reaches of the mixed deciduous forests and in the lower reaches of the temperate Zone below *Cedrus deodar* (Deodar), *Picea smithiana* (Srna) and *Abies pindrow*, (Fir). However in Parvati Valley in H.P., the behaviour of Chir is abnormal with respect to the altitudinal Zonation and Chir is observed above Deodar and this is evident at Kasol, situated in the Parvati Valley.

In the Parvati valley of the Kulu Himalaya, both Xerophilous and hygrophilous Communities are found on the same aspect, and Chir pine which is usually found on the warmer Southern aspects is found on northern aspects. This indicates that there is another more potent factor, than aspect which determines the distribution of this specie.

Chir pine in the Kulu Himalayas occur on Skeletal or immature Soils while Blue pine (*Pinus wallichiana*) and Deodar (*Cedrus deodar*) are found on the best developed podsolc profiles in the area under uniform climatic conditions. The maturity of the Soil is a function of climatic and geological formation. Assuming that the climate is uniform in the valley, it is the geological features of the area, which determines the maturity of the Soil, and hence the forest types.

The effect of rock, on surface vegetation is two fold: (a) Lithological and (b) Structural. The Lithological effect is exhibited, by the presence or absence of mineral elements in the rock. The structural effect by way of ip and Scarp determines the moisture content, base saturation, pH etc. The dip slopes are rich in mineral water, while the scarp slopes in leached hf mineral salts, which seeps in the direction of the dip of the Strata of the rock. Therefore the Soils on dip slope are expected, to have better moisture content as compared to that on the Scarp slope.

The dominant rock between Jari and Manikaran is quartzite, interbedded locally with thick bands of mica schists, phyllites, sandstones and shales. The strata of the rock dips towards NNE. The S-W tides in all side valleys are therefore scarp slopes while dip slopes are on the N-E sides. Both sides in the Parvati valley between Jari and Manikaran are scarp faces.

Topographically, Scarp slopes in the area are steep and precipitous and Soil seldom, collects in appreciable quantity along them. At lower levels, scree, chiefly consisting of large blocks occur and there too are mostly unstable. The dip slopes, are invariably gentle, and are topographically stable.

The Quartzite rock is poor in Calcium Salts, hence Soil on Scarp slopes are usually base deficient and dry, while those in dip slopes, are less base deficient, and moist. This is evidenced by scarp slopes being often bare and supporting only stunted trees of Chir pine, while dip slopes have good forests of Kail (*Pinus wallichiana*) or Chir-Kail Community in developmental stages. The alluvial deposits near the base of the river, are very fertile and supports some of the best forests of Deodar and Kail. Freshly laid deposits, bear groves of *Alnus nitida* accompanied with *Aesculus indica*, populus, *Quercus dilatata* etc.

Thus the abnormal behaviour of Chir, in the Parvati valley of Kulu Himalayas, can be basically ascribed to the edaphic factors arising out of the geological formations, in that region. This is a clear example of how the vegetation, at any place is a function of the edaphic factor, resulting in the aberration in the altitudinal Zonation in vegetation.

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दुर्लभ वन्य जीवों को बचाइये

रामेश बेदी

प्रकृति हमारे देश पर बहुत उदार रही है। हमें यहाँ ठण्डे और गरम सभी प्रकार के जलवायु मिल जाते हैं। उफ़नती हुई नदियों, शान्त झोलें, अथाह गहराई के समुद्र, वरफ से ढके पहाड़ों की सफेद चोटियाँ, घने जंगल - प्रकृति की सभी आकर्षक चीजें यहाँ मौजूद हैं। हमें इस बात का गर्व है कि पशु-पक्षियों की बहुत अधिक जातियाँ हमारे देश में पाई जाती हैं - पक्षियों की करीब दो हजार जातियाँ और स्तनपायी जानवरों की पाँच सौ जातियाँ। कीड़ों और पतंगों की तोस हजार जातियों का कोट विशारद भारत में पता लगा चुके हैं। रेंगने वाले जीवों और मछलियों की संख्या इन से अलग है।

अश्वमेध यज्ञ—राष्ट्रीय पशु मेला : जंगल के जीवों को समझने और उन्हें मनुष्य के अधिक नज़दीक लाने का सर्वप्रथम श्रेय हमारे क्रान्तदर्शी ऋषियों को दिया जा सकता है। वैदिक काल में वे एक राष्ट्रीय यज्ञ किया करते थे। जिसे अश्वमेध यज्ञ कहा जाता था। इस यज्ञ में भारत के कोने कोने से जंगली और पालतू पशु ला कर प्रदर्शित किये जाते थे। इन में हाथी और गण्डे जैसे महाकाय जानवर, बाघ और गुलदार जैसे हिंसक पशु, चीतल और नीलगाय जैसे तृण भोजी, मगर और कछुए जैसे अर्द्ध जलचर जीव, अनेक प्रकार के पक्षी और कीट पतंगों को कई जातियाँ होती थीं। इस महायज्ञ में लाये जाने वाले प्राणियों की कुल संख्या छह सौ नौ थी। यजुर्वेद के चौबीसवें अध्याय में इन पशु-पक्षियों के नाम गिनाये हैं और इन के रूप-रंग का भी वर्णन किया है। इस राष्ट्रीय पशु मेले को समाप्ति पर सभी वन्य जीवों को जंगल में मुक्त कर दिया जाता था।

धर्मारण्य कः श्रृंगशेखः : जंगली जीवों के संरक्षण की भावना हमारे देश में इतनी व्यापक हो गई थी कि जगह-जगह ऐसे स्थान सुरक्षित कर दिये गये थे जहाँ उन का शिकार करना या उन्हें किसी प्रकार से सताना बिल्कुल बन्द था। जंगली जीवों का संरक्षण एक पुनीत धार्मिक कर्तव्य हो गया था। इसी लिये ऐसे जंगलों को धर्मारण्य या अभयारण्य कहते थे। ईसा से करीब तीन सौ साल पहले पाटलिपुत्र (वर्तमान पटना) के प्रधान मन्त्री कौटिल्य ने अपने अर्थशास्त्र में लिखा था कि उन अभयारण्यों में पेड़, बांस, बेंत और घास काटना, पत्ते तोड़ना, ईंधन काटना, लकड़ी जला कर कोयला बनाना, जानवरों की खालें निकालना और हड्डियाँ बटोरना कतई मना था। इन कामों से वन्य जीवों के सामान्य जीवन में खलल पड़ता है।

तीसरी शताब्दी ईस्वी पूर्व में सम्राट अशोक ने शिकार करने पर पाबन्दी लगा दी थी। २४२ ईस्वी पूर्व में अशोक स्तम्भ के पाँचवें आदेश में सम्राट ने कुछ पक्षियों और पशुओं के नाम खुदवाये थे

जिन का कठोरता से संरक्षण किया जाना चाहिए। इस आदेश में जंगल में आग लगाने की मनाही की गई है। आजकल के नेशनल पार्क और सैक्यूरियाँ (अभय वन) उन्हीं आधारभूत सिद्धान्तों और जीवदया की भावना पर विकसित हुई हैं जिन के बीज हमें पवित्र वेदों में मिलते हैं और जिन का प्राकृतिक कौटिल्य अर्थशास्त्र में स्पष्ट रूप से प्रतिपादित है।

अश्वेथ शिक्कर : आजादी के बाद भारत की नयी सरकार कितने ही महत्वपूर्ण कामों से उलझी थी। तब जंगल के प्राणियों का बेहद शिकार किया गया। संक्रमण काल में पुराने शासकों का नियन्त्रण तो खत्म हो चुका था और नयी सरकार ने जब इधर ध्यान देना शुरू किया तो जंगलों और वन्य प्राणियों की अपार क्षति हो चुकी थी। नवम्बर १९५२ में वन्य जीवों की भलाई के लिए एक बोर्ड बना दिया गया। उनके संरक्षण के लिए नये-नये अभयवनों और नेशनल पार्कों की स्थापना को जानें लगी। कश्मीर से कन्याकुमारी तक और मुख्य भूमि से दूर अण्डमन-निकोबार तक इनका जाल सा बिछा दिया गया। १९८२ के अन्त तक सारे देश में लगभग दो सौ पचास अभयवन और नेशनल पार्क बनाये जा चुके थे जो ७५,७६३.२३ वर्ग किलोमीटर क्षेत्र में फैले थे। हमारे देश के आरक्षित वनों के क्षेत्रफल का यह उन्नीस प्रतिशत है और भारत के कुल भौगोलिक क्षेत्रफल का २.३ प्रतिशत है।

अभयवनों में जीवों को कानूनी रूप से अभयदान देने के बाद भी संरक्षण की अनेक समस्याएं सामने आती हैं। अवैध रूप से शिकार करने वाले पोचर प्रायः सभी जगह जंगल के जानवरों को चोरी छुपे मारते हैं। आहार के लिए तथा मृगया की लालसा के लिए जंगली जीवों का बेहिजाब शिकार किया जा रहा है। नये-नये-उद्योग-धन्धों के विकास के लिए जंगलों को उनकी क्षमता से अधिक दोहन किया जा रहा है। ऐसी विषम परिस्थितियों में वन्य प्राणियों की संख्या बहुत कम रह गई है। बहुत से जानवर, पक्षी और सरीसृप विनाश के कगार पर आ पहुँचे हैं।

संरक्षण : हमारी नैतिक जिम्मेदारी : वन्य प्राणियों और वनस्पतियों की दुर्लभ तथा संकटापन्न जातियों के अन्तर्राष्ट्रीय व्यापार की समीक्षा करने के लिए पच्चीस फरवरी से आठ मार्च १९८१ तक नई दिल्ली में एक सम्मेलन हुआ था। प्रतिनिधियों को भारत के दुर्लभ एवं संकटापन्न वन्य प्राणियों और वनस्पतियों का परिचय देने के लिए भारतीय प्राणी सर्वेक्षण के निदेशक ने एक पुस्तिका प्रकाशित की थी। इस में छिहत्तर स्तनपोषी जानवर, अड़तालीस पक्षी और चौदह सरीसृप गिनाये थे। इन के संरक्षण के लिए आवश्यक कदम उठाये जा रहे हैं।

किसी वन्य प्राणी को बचाने की बात जब हम करते हैं तो उस का अर्थ होता है कि हमें उन परिस्थितियों का संरक्षण करना है जिन में उस का जन्म हुआ था और जिन में वह हजारों सालों से वंशवृद्धि करता आया है। ये परिस्थितियाँ चिड़ियाघर नहीं हैं, अपितु जंगल हैं, अभयवन हैं और नेशनल पार्क हैं। इनमें पनपने के लिए वन्य जीवों का पर्याप्त आश्रय, आवरण, पानी,

आहार और सुरक्षा मिलती रहे—यह हमारी जिम्मेदारी है। यही संरक्षण है। समुचित संरक्षण न मिला तो ये दुर्लभ और संकटापन्न जीव हमारी धरती से लुप्त हो सकते हैं। ये नष्ट हो गये तो हमारे देश के जंगलों का सौन्दर्य और रौनक खत्म हो जायेंगे। हमारा जीवन नीरस बन जायेगा।

चीते को फिर बस7इये : चीते का शरीर गठा हुआ और सुन्दर होता है। बाल आकर्षक होते हैं। अपेक्षाकृत यह कम शर्मीला होता है और अपने आप में ही संतुष्ट रहता है। मैं इसे जंगल का राजकुमार कहा करता हूं। पहले जमाने में हमारे देश के राजा और नवाब इसे पालते थे और इस से हिरणों का शिकार करवाते थे। यह सब से अधिक तेज दौड़ने वाला जानवर है। मुगल सम्राट अकबर (१५५६-१६०५ ईस्वी) ने शिकार के लिए एक हजार चीते पाल रखे थे। यह इस बात का द्योतक है की उस समय हमारे जंगलों में ये प्राणी बड़ी संख्या में मिल जाते थे। इस शताब्दी के शुरू में ही इन का तेजी से ह्रास हो चुका था। उत्तर प्रदेश के मिर्जापुर जिले में १९१८ में एक और १९१९ में एक चीता मारे जाने का उल्लेख मिलता है। इस से पूर्व पच्चीस बरसों में उत्तर प्रदेश में कुल पाँच चीतों के मिलने की जानकारी है। मध्य प्रदेश में किसी समय चीतों का पाया जाना असाधारण बात नहीं थी। हैदराबाद दक्खन के ईर्दगिर्द ये आम मिल जाते थे। अनुमान है कि १८८४ में काठियावाड़ में बीस से अधिक चीते नहीं बचे थे। १८९४ में एक मादा चीता और चार बच्चे राजकोट में शूट किये गये थे। १९१८ तक ये छोटी टोलियाँ में मिल जाते थे। घुड़ सवार सेना के एक अफसर ने घोड़े से पोछा कर एक ही दिन में छह चीतों को बल्लम से मारा था। १९४८ में आन्ध्र प्रदेश में तीन चीते मारे जाने का उल्लेख है। १९४७-४८ की सरदियों में कोरेआ रियासत में तीन चीतों को शूट करने के साथ भारत में इस खूबसूरत जीव का दुःखद अन्त हो गया। ये तीनों नर चीते थे और एक बहादुर स्पोर्ट्समैन ने एक ही जगह एक रात कृत्रिम प्रकाश में उन्हें मार गिराया था। कोरेआ रियासत मध्य प्रदेश में बस्तर के उत्तर में थी। तामिलनाडु के चित्तूर जिले में १९५२ की वसन्त में चीता देखने की बात कही जाती है। कुछ प्रकृति प्रेमी इसे निरी अफवाह बताते हैं जिस की पुष्टि नहीं की जा सकी। पर, भारतीय प्राणी सर्वेक्षण की रिपोर्ट (१९८१) के अनुसार भारत में चीते के अस्तित्व का यह अन्तिम प्रामाणिक उदाहरण था।

मैं जानता हूं कि अनेक देशों में दूसरे देशों के पशु-पक्षी और वनस्पतियाँ सफलतापूर्वक सम्प्रविष्ट की जा रही हैं। मध्य प्रदेश में ही पच्चीस नेशनल पार्क, अभयारण्य और आरक्षित वन खण्ड विद्यमान हैं। इन में से किसी में तो हम चीते को फिर से बसाने के प्रयत्न कर सकते हैं। इस प्रदेश में इस के पाये जाने पुराने रिकार्डों को देखते हुए मैं आशा करता हूं कि इस दिशा में किये गये परीक्षण सफल होंगे।

तिरस्कृत वन7इये : जंगल का राजा सिंह मनुष्य के हाथों जितना तिरस्कृत हुआ है उतना शायद ही कोई जानवर हुआ हो। पहले इसे राष्ट्रीय पशु जैसा सम्मान दिया जाता था। भारत क्या, अन्य देशों के राज-चिन्हों में भी सिंह चित्रित है।

भारत के कई प्रदेशों में पाया जाने वाला यह माहामहिम जानवर अपने अन्तिम आश्रय स्थल सासण गिर के अभयवन में बचा है। वह १,४१२ के वर्ग किलोमीटर में दो सौ के लगभग सिंह रहते हैं।

तीसरी शताब्दी ईस्वी पूर्व प्रधान मन्त्री कौटिल्य ने अभयवनों के रख रखाव के लिए जो नियम बनाये थे उन में से शायद ही किसी का गिर-वन में परिपालन किया जा रहा है। खेतिहरों और पशुपालकों ने अभयवन की तीस से चालीस प्रतिशत जमीन पर कब्जा कर लिया है। वनों के भीतरी भागों में दूर-दूर तक खेतों का विस्तार होता जा रहा है। गन्ने और मूंगफली जैसी औद्योगिक फसलों की पैदावार बढ़ने के साथ नई-नई सड़कों का निर्माण हो गया है। सिंह के निवास का दायरा सिकुड़ गया है। सौ साल नहीं गुजरे, गिर-वन का क्षेत्रफल मौजूदा क्षेत्रफल से तिगुना था। पशुपालकों के हजारों पालतू ढोर अभयवन के अन्दर रहते हैं। घास के लिए नीलगाय, चीतल व अन्य आखेट्य पशुओं की इन ढोरों से जबरदस्त प्रतिस्पर्धा है। इसमें जंगल के वृषभोजी घाटे में रहते हैं। पर्याप्त घास न मिलने से वह पनप नहीं पाते। ये मृग सिंह का प्राकृतिक भोजन है। इन की संख्या में कमी हो जाने से सिंहों के लिए पालतू ढोरों को खाने के अलावा कोई मार्ग नहीं बचता। सिंह जिन ढोरों को मारते हैं वे सब उन्हें खाने को नहीं मिलते। ढोर को मार कर वह उसे नाले में घसीट कर ले जा रहा होता है कि पशुपालक शोर मचाते हुए दौड़ते हैं। गुराँकर नाराज़गी प्रकट करता हुआ सिंह मारण को छोड़ कर नाले में उतर जाता है। हरिजन खाल उतारने और मांस काटने के उद्देश्य से दलबल के साथ लाश पर धावा बोल देते हैं। मरे हुए जानवर गिद्धों, गुलदारों, लकड़बग्घों और नेवलों की छोना झपटी भी रहती है। तेईस प्रतिशत लाशों को तो सिंहों को बिलकुल नहीं खाने दिया जाता। बीस प्रतिशत लाशों में वह कुल दस किलोग्राम गोشت खा पाता है। गिर के सिंहों को हर रोज पर्याप्त भोजन नहीं मिलता।

सिंहों को ज़हर दे कर मारने की वारदातें अब भी हो रही हैं। १९७१ के शुरू में हम लोगों ने सासण गिर रेस्ट हाऊस से चार किलोमीटर दूर गरीब नामक एक सिंहनी के फोटो खींचे थे। उसके साथ दो बच्चे भी थे। उसी साल हमें दुबारा वहाँ जाने का मौका मिला। पता चला कि गरीब और उसके बच्चों की अमृत वेल नेस के पशुपालक ने ज़हर दे कर मार दिया है। गरीब ने अपने नन्हें बच्चों की भूख मिटाने के लिए उस का बछेरा मारने का अपराध किया था। वन-विभाग के अधिकारियों से छुपाने के लिए हत्यारे ने गरीब को बच्चों समेत जला दिया था। ऐसी गम्भीर अपराध कर के भी हत्यारा अदालत से साफ छूट गया। उसके खिलाफ कोई भी गवाही देने को तय्यार नहीं था। इस प्रकार के अपराध दूसरे अभयवनों में भी किये जा रहे हैं।

वन्य जीवों के ह्रास को रोकने के लिए देहली जैसे शहरों के प्रबुद्ध नागरिक और सरकारी अफसर यद्यपि पर्याप्त जागरूक हैं फिर भी यहाँ एक अदालत को एक अपराधी को दण्डित करने में छह बरस लग गये थे। यह एक दर्जन जाति के जानवरों की दो सौ से अधिक खालों के साथ पकड़ा गया था।

लगभग पचास खालें संरक्षित जानवरों की सूची की थी। यह अनधिकृत रूप से खालों का व्यापार करता था। छब्बीस दिसम्बर १९८२ को इसे केवल एक साल की जेल और दो हजार रुपये जुर्माने का दण्ड सुनाया गया।

सिंहों को अतीत के ऊँचे दर्जे तक पहुंचाने के लिए अनेक उपाय करने होंगे। उसे दूसरे राज्यों में बसाना होगा। वाराणसी से लगभग सत्तर किलोमीटर दूर चकिया वन के अन्दर चन्द्रप्रभा अभयवन में १९५७ में सिंहों को बसाने की कोशिश की गई थी। उस में सफलता नहीं मिली थी। वहाँ जो भूले हो गई थी उन्हें हमें दुबारा नहीं होने देना चाहिए।

गिर-वनों की गिरी हुई अवस्थाओं को सुधारने के उपायों में आवश्यक है कि जंगल में पैदा हुई घास में से पच्चीस प्रतिशत से अधिक काट कर ले जाने की इजाजत नहीं दी जानी चाहिए। यथा सम्भव पालतू ढोरों को चरने से रोकना चाहिए और पशुपालकों को अभयवन के अन्दर से हटा कर दूसरी जगह बसाने का काम तेजी से करना चाहिए।

शेर बचत लियत गयत : आज़ादी से पहले की रियासतों के राजाओं की परम्परागत मेहमाननवाजी का एक अंग विशिष्ट मेहमानों को शेर का शिकार करने के लिए आमन्त्रित करना और उन से शेर मरवाना रहा है। एक बहादुर महाराज ने अपने जीवन काल में छह सौ सोलह शेर मारे थे। एक महाराजा ने १८७१ और १९०७ के बीच छत्तीस बरसों में तीन सौ सत्तर शेर मारे थे। कर्नल केसरी सिंह ग्वालियर और जयपुर राज्यों में शिकार विभाग के अध्यक्ष थे। उन्होंने अपने बीस साल के कार्यकाल में लगभग दो सौ शेर तो खुद मारे थे और एक हजार शेरों का शिकार करवाया था। ग्वालियर के महाराजा सर माधोराव ने लगभग आठ सौ शेरों का शिकार किया था। ताप्ती नदी के किनारे १८६२ में एक शिकारी ने पाँच दिन में दस शेर मार लिये थे। लोर्ड हार्डिंग ने ग्वालियर के पास तीरा में एक ही दिन में आठ शेर मार गिराये थे। नौगरेडे ने असम में पन्द्रह मिनट में पाँच शेर मारे थे। कर्नल वी० के० वर्न के शिकार जीवन में सब से अधिक रोमांचक बात एक मिनट में तीन शेर शूट करना था। क्रम्प के दल ने पहाड़गढ़ (राजस्थान) में पाँच सेकण्ड में पाँच शेर का शिकार करने में कैसी जबरदस्त होड़ लगी थी।

इन शिकारों में कुछ शेर तो प्राणी की खूबसूरत खाल और ट्रैफ़ियों से महलों को सजाने के लिए मारे गये थे, पर अधिकतर हत्याएँ अपने शौर्य की गाथाओं में चार चाँद लगाने के लिए की गई थीं। एक ज्योतिषी ने महाराजा मैसुर को बताया था कि पिचहत्तर शेरों का शिकार करने के बाद उन्हें पुत्र लाभ होगा। उनका कुमार जब अठारह मास का हुआ तब वे एक सौ तीन शेर मार चुके थे।

शेर के विनाश की तस्वीर का यह पहलू ऐसा है जिसे हम कानून सम्मत कह सकते हैं। उन दिनों कानून में इसके लिये प्रावधान था। गैरकानूनी रूपी से पोचरों द्वारा खाल के लिए शेर का

जो शिकार किया जाता था उसका कोई हिसाब नहीं। जिस पशुपालक के ढोरों पर यह हमला करता था वह भी इसे नहीं बख़्शता था। ढोर की लाश में विष मिला कर वह शेर के समूचे परिवार से निपटने की कोशिश करता था।

१९७२ से शेर हमारा राष्ट्रीय पशु है। जिन जंगलों में सिंह रहता है वहां शेर नहीं रहता। सिंह रहित जंगलों में शेर का ही एकत्र राज्य होता है और सही मायनों में यह उन जंगलों का राजा है। सिंह की निस्वत यह हमारे देश के अधिक जंगलों में पाया जाता है। यह हमारे जंगलों की शान है और वन्य जीवों का प्रतीक बन गया है।

अभी मैंने शेर के शिकार की कुछ संख्याएं बताई हैं। उन दिलचस्प संख्याओं से अनुमान होता है कि शेर यहां गली के आवारा कुत्तों के समान बड़ी संख्या में घूमते फिरते थे, और म्युनिसिपैलिटी के कुत्तामार दस्तों के समान शिकारी हाथ धो कर उन के पीछे पड़े रहते थे। मेरे इस कथन की पुष्टि इस बात से होती है कि इस शताब्दी के शुरू में भारत में शेरों की संख्या चालीस और पचास हजार के बीच कूती जाती थी। यह संख्या तेज़ी से गिरती गई। १९७६ की अधिकृत रिपोर्ट के अनुसार भारत में कुल २,४८४ शेर थे। इन की संख्या बढ़ कर १९२४ में ३,५०० हो गई थी।

दूसरे महायुद्ध के बाद चतुर्मुखी विकास के लिए उद्योग प्रतिष्ठानों, सिंचाई और बिजली की परियोजनाओं के निमित्त जंगलों के बड़े भाग साफ कर दिये गये। निरन्तर बढ़ती हुई जनसंख्या को कृषि योग्य भूमि देने के लिए और शरणार्थियों को बसाने के लिए बड़े भूभागों में जंगल गिरा दिये गये हैं। जब भारत आजाद हुआ उस समय लगभग तैंतीस प्रतिशत भूभाग पर जंगल फैले हुए थे। अब लगभग बाईस प्रतिशत भूभाग में रह गये हैं।

शेरों के तथा वन्य प्राणियों के सर्वोत्तम निवास साफ कर दिये गए हैं। मनुष्य को आबाद करने और उसे खुशहाल तथा समृद्ध बनाने की इन परियोजनाओं में शेरों को और दूसरे वन्य जीवों को नष्ट कर दिया गया है। इस सीधी हानि के अलावा आरक्षित वनों के भीतरी भागों में खेती करने के अधिकार दे देने से अनेक प्रकार की कहानियां हुई हैं। किसानों और उन के ढोरों ने जंगल को तहस-नहस कर दिया है। फसलों की रक्षा करने के बहाने जंगली जीवों को या तो शूट कर दिया गया है या फन्दों में फंसा कर मार डाला गया है।

जंगल में शायद ही कोई ऐसा इलाका हो जहां इन्सान का कारोबार न फैला हो। पेड़ों का छपान, कटान, चिरान, सोखते और लकड़ी का लदान, बाँस, बेंत व घास की कटाई, पत्तों, गोंदों व औषधियों का संग्रह, भैंसों के लिए पेड़ों का छांगना, ढोरों को चराना—सभी प्रकार के क्रियाकलाप निरन्तर जारी हैं। बी० बी० सी० एक फ़िल्म के शूटिंग के लिए नरेश, राजेश और में १९८२ की गरमियों में हरिद्वार से गंगा पार के जंगलों में गये थे। वहां हम ने हर रोज सौ से अधिक औरतों और आदमियों को ईंधन के गट्टरों को सिर पर लाद कर शहर में बेचने के लिए ले जाते

देखा था और इस दृश्य को फिल्माया था। १९३० के शतक में इन पहाड़ी जंगलों में प्याल खाने और वन्य जीवों को देखने जाया करता था। उन दिनों के जंगलों से वर्तमान जंगलों की तुलना करता हूं तो लगता है कि जैसे सारा जंगल ही शहर में ढो लिया गया हो। गांवों और छोटे शहरों के लिए ऊर्जा की सचमुच विकट समस्या है। लकड़ी न मिले तो उनके चूल्हे न जलें।

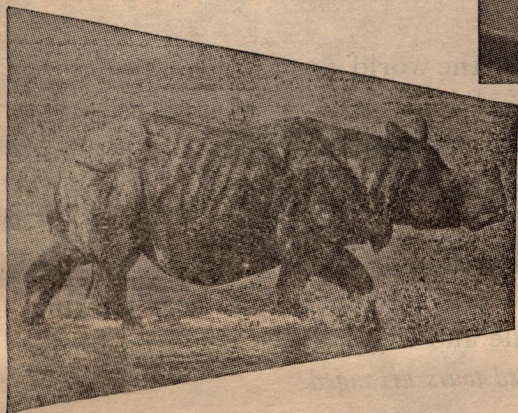
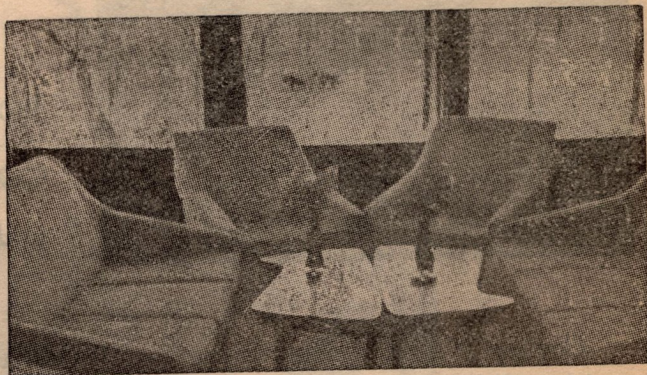
मावा बनाने की भट्टियाँ, कत्थे के झाले और गांजा बनाने वालों के डेरे मुझे अक्सर जंगलों में मिल जाते हैं। वाहनों और लारियों के दिन भर उठने वाले शोर-शराबे में शेर जैसा शर्मीला प्राणी शान्तिपूर्वक नहीं रह सकता। दिन में जब उसे चुपचाप सोते रहना चाहिए वह या तो बेचैनी में भागता फिरता है, या पड़ोस के खेतों में शरण लेता है जहां ऊँची फसलों के अन्दर कुछ आराम मिल जाता है। मैंने शेरनियों को गन्ने के खेतों में अपने बच्चों को पालते देखा है।

शेर के संरक्षण के लिए कन्द्रीय सरकार ने एक महती योजना बनाई है। इस के अन्तर्गत दस राज्यों में ग्यारह आरक्षित वनों के अन्दर शेर को संरक्षण दिया जा रहा है। इन वनों में ५,८०० वर्ग किलोमीटर भूमि है। यह देश के जंगलों के कुल क्षेत्रफल का लगभग २.१० प्रतिशत है और देश के भौगोलिक क्षेत्रफल का लगभग ०.४९ प्रतिशत है। इस में शेरों को पूर्ण सुरक्षा प्रदान की गई है। इस के परिणाम स्पष्ट हैं। १९७२ में, जब बाघ संरक्षण योजना प्रारम्भ की गई उस समय के नौ बाघ आरक्षित वनों में २६८ शेर थे और १९७६ में ग्यारह आरक्षित वनों में ७११ हो गये थे। १९८२ में इनकी संख्या ७५७ हो गई थी। जुलाई १९८२ में प्रोजेक्ट टाईगर की स्टीऊरिंग कमेटी के निर्णय के अनुसार शेर आरक्षित वनों की संख्या ग्यारह से बढ़ा कर पन्द्रह कर दी गई थी।

शेर को संकटापन्न अवस्था से निकालने के लिए केवल कानूनी संरक्षण देने से काम नहीं चलेगा, उस के आहार के प्राणियों को मारना भी बन्द करना होगा जिससे उसे जंगल में भरपेट भोजन मिल सके और वह पालतू जानवरों को न मारे तथा मनुष्य पर हमला न करे। इस के साथ ही जंगलों के कटान और विनाश को रोकना परम आवश्यक है लड़ाख से कन्या कुमारी तक सफर करते हुए मैंने अनुभव किया है कि बेशुमार धरती खाली पड़ी है। उस पर स्थानीय लोगों को सामुदायिक वन लगाने की शिक्षा देनी चाहिए। इनसे उन्हें जलावन तथा मकान बनाने के लिए लकड़ी मिलयी रहेगी। हिमालय, शिवालिक, विन्ध्य और दूसरी पर्वत शृंखलाएं जो अत्याधिक दोहन से नग्न हो गई हैं उन पर वृक्षों का रोपने का कार्य तेजी से किया जाना चाहिए। कोई कारण नहीं कि योजनाबद्ध जंगलों के रोपण और विकास से हम वनों पर आधारित देश की सभी प्रकार की जरूरतों को पूरा न कर सकें। मानवीय निवासों से दूर के इन जंगलों में स्वच्छन्दता से विचरते हुए वन्य जीवों का मनुष्य से किसी प्रकार का टकराव भी नहीं होगा। शेर और वन्य जीवों के संरक्षण का यह कारगर उपाय है।

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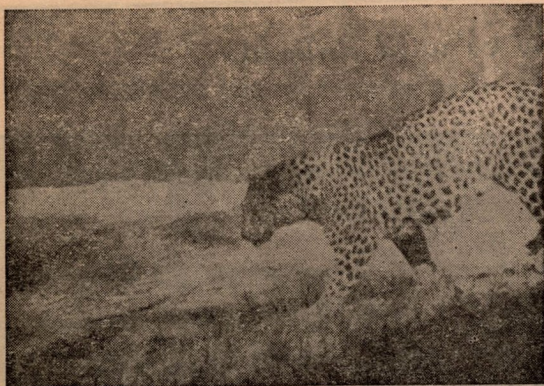
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(See Article on Page 54)



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